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Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 24.2% of Alabama farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 4.0% of Alabama farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Alabama, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Alabama to maintain its rightful place in our national economy.

It is the purpose of this section of the Alabama state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range post-war periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	231,746a/
Total farms with electric service . . .	56,200b/
Percent of farms electrified	24%b/
Total rural farm dwelling units	311,075a/
Total rural farm dwelling units with electric service	38,869a/
Percent rural farm dwelling units with electric service	13%a/
Total rural non-farm dwelling units . . .	164,531a/
Total rural non-farm dwelling units with electric service	86,913a/
Percent rural non-farm dwelling units with electric service	54%a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 20,289 additional consumers have been served by REA-financed systems since the 1940 census)	342,916a/c/
Total miles of REA-financed lines in state of Alabama . . . . . (as of October 31, 1943)	10,039
Total consumers served by REA-financed systems in Alabama . . . . . (as of October 31, 1943)	32,897

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and in creases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 250,130 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	15,041,700	$85,181,000
Farmstead Wiring	6,004,300	17,509,100
Farm & Home Equipment		33,709,500
Plumbing	6,002,400	9,510,000
Totals	27,048,400	$145,909,600

It is estimated that approximately 22% of the unserved rural establishments in Alabama can be served only under broadened standards of feasibility. This is a total of about 70,500 establishments which represent the lower income homes and those establishments which are scattered throughout the state in small isolated areas.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

The expenditures for electrical and plumbing equipment cover the initial purchases which will be made during the first 18 months of service. No consideration is given to additional purchases over a long-time period. Estimates were based on REA saturation survey of 1941, with percentages increased to take care of wartime savings, group purchases, etc.

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of connections under WPB regulations to date.

Average cost per mile of line	$768.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 50.00
Man-hours per farmstead	22

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 50.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$757.00
Man-hours per mile of line	182
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$ 65.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	24

An expenditure of $20.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring.

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$150.00
10% " " " " " "	350.00
40% " " " " " "	35.00
and that:	
50% of present consumers each will spend approximately	$ 60.00
10% " " " " " " "	200.00
40% " " " " " " "	25.00

PLUMBING EXPENDITURES

Based on the assumption that:

20% of new and present consumers will install water system and sink at average cost of	$128.00
10% of new and present consumers will install complete bath at average cost of	$ 78.00

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 242,300 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total farms electrified since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1,042.00
Man-hours per mile of line	182

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	24

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $146,000,000.

Specifically for the estimate of the approximately 15 million man-hours work involved in direct labor for construction of lines, it is estimated that about 60 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 27 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of

rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation. . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

CALIF. COLO. DEL. GA. IDAHO ILL. IND. IA. AN.

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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 41.2% Arizona farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 29.6% Arizona farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Arizona, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Arizona to maintain its rightful place in our national economy.

It is the purpose of this section of the Arizona state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	18,468	a/
Total farms with electric service . . .	7,600	b/
Percent of farms electrified	41%	b/
Total rural farm dwelling units	32,163	a/
Total rural farm dwelling units with electric service	9,524	a/
Percent rural farm dwelling units with electric service	30%	a/
Total rural non-farm dwelling units . .	62,038	a/
Total rural non-farm dwelling units with electric service	43,902	a/
Percent rural non-farm dwelling units with electric service	72%	a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 878 additional consumers have been served by REA financed systems since the 1940 census)	40,118	a/ c/
Total miles of REA financed lines in state of Arizona . . . . . (as of October 31, 1943)	618	
Total consumers served by REA financed systems in Arizona . . . . . (as of October 31, 1943)	1,305	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Western area of the U.S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water.	26.6
With flush toilet	17.3
With bathtub or shower. . . .	18.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 26,464 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	4,311,150	$14,019,200
Farmstead Wiring	666,750	2,221,620
Farm and Home Equipment		4,794,500
Plumbing	984,600	1,808,000
Totals	5,962,500	$22,843,320

It is estimated that approximately 13,000 unserved rural establishments in Arizona can be served only under broadened standards of feasibility. These establishments represent approximately 33% of the total unserved rural establishments and are located in the more sparsely settled areas which constitute about 50% of the total area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

ARIZONA

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$900.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 75.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750.00
Man-hours per mile of line	200

Potentials along existing lines - Based on assumption that 50% of potentials will be connected

Average cost of connecting potentials	$100.00
Man-hours for connecting potentials	50

FARMSTEAD WIRING

Average cost per consumer	$100.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$200.00
10% " " " " " "	450.00
40% " " " " " "	75.00

and that:

50% of present consumers each will spend approximately		$ 70.00
10% " " " " " "		250.00
40% " " " " " "		25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of $128.00
25% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 25,396 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$650.00
Man-hours per mile of line	200

FARMSTEAD WIRING

Average cost per consumer	$100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $23,000,000.

Specifically for the estimate of the approximately 4 million man hours work involved in direct labor for construction of lines, it is estimated that about 16 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 6 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

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"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in period of depression. It will be rembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

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While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 16.6% of Arkansas farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 1.2% of Arkansas farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

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1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	216,674	a/
Total farms with electric service . . .	35,900	b/
Per cent of farms electrified	17%	b/
Total rural farm dwelling units	276,637	a/
Total rural farm dwelling units with electric service	21,669	a/
Per cent rural farm dwelling units with electric service	8%	a/
Total rural non-farm dwelling units . .	116,225	a/
Total rural non-farm dwelling units with electric service	49,851	a/
Per cent rural non-farm dwelling units with electric service	44%	a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 14,195 additional consumers have been served by REA-financed systems since the 1940 census)	316,491	a/ c/
Total miles of REA-financed lines in state of Arkansas . . . (as of October 31, 1943)	9,027	
Total consumers served by REA-financed systems in Arkansas . . . (as of October 31, 1943)	25,373	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern area of the U. S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per Cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum Cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water Systems and Pump Jacks	11.9
Cream Separator	2.5
Poultry Lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per Cent
With running water	2.7
With flush toilet	1.7
With bathtub or shower	1.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B. and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 196,500 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line Construction	13,726,300	$39,612,400
Farmstead Wiring	5,466,500	17,487,800
Farm and Home Equipment		32,453,000
Plumbing	7,009,000	10,605,000
Totals	26,201,800	$100,158,200

It is estimated that approximately 105,800 rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately 35 per cent of the unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U 1-c connections to date

Average cost per mile of line	$ 725.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 50.00
Man-hours per farmstead	22

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 50.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 630.00
Man-hours per mile of line	230
Potentials along existing lines - Based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$ 150.00
Man-hours for connecting potentials	15

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	24

An expenditure of $30 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 200.00
10% " " " " " "	300.00
40% " " " " " "	50.00

and that;

50% of present consumers each will spend approximately	$ 70.00
10% " " " " " " "	250.00
40% " " " " " " "	40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% of new and present consumers will install water system and sink at average cost of	$ 128.00
18% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 184,650 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$ 600.00
Man-hours per mile of line	210

FARMSTEAD WIRING

Average cost per consumer	$ 90.00
Man-hours per farmstead	28

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and houshold appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $100,000,000.

Specifically for the estimate of the approximately 14 million man-hours work involved in direct labor for construction of lines, it is estimated that about 56 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 26 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of

rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit." continues the report, "which rural eletrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

CALIF. COLO. DEL. . GA. IDAHO LL. IND. IA. AN.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 86.7% of California farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 53.9% of California farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in California, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of California to maintain its rightful place in our national economy.

It is the purpose of this section of the California state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available:

2. Optimum application of electricity to farm production and farm family living:

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement:

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	132,658 a/
Total farms with electric service . . .	115,000 b/
Per cent of farms electrified	87% b/
Total rural farm dwelling units	192,614 a/
Total rural farm dwelling units with electric service	153,791 a/
Per cent rural farm dwelling units with electric service	81% a/
Total rural non-farm dwelling units . .	468,060 a/
Total rural non-farm dwelling units with electric service	415,202 a/
Per cent rural non-farm dwelling units with electric service	90% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 953 additional consumers have been served by REA-financed systems since the 1940 census)	88,358 a/c/
Total miles of REA-financed lines in state of California . . . . (as of October 31, 1943)	1,465
Total consumers served by REA-financed systems in California . . . . (as of October 31, 1943)	4,208

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Western area of the U.S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	77.4
With flush toilet	55.2
With bathtub or shower	60.6

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 81,619 rural establishments which might be served under present standards of feasibility.

These totals are as follows;

	Man-hours	Cost
Line construction	7,310,700	$35,018,000
Farmstead Wiring	2,449,250	10,202,600
Farm & Home Equipment		12,625,100
Plumbing	1,141,300	4,351,800
Totals	10,901,250	$62,197,500

It is estimated that approximately 8,000 of the 14,000 unserved rural establishments in Southeastern California can be served only under broadened standards of feasibility.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1350
Man-hours of labor per mile of line	400

FARMSTEAD WIRING

Average cost per consumer	$100
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$72

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1200
Man-hours per mile of line	300

Potentials along existing lines - Based on assumption (that 50% of potentials will be connected)

Average cost of connecting potentials	$250
Man-hours for connecting potentials	40

FARMSTEAD WIRING

Average cost per consumer	$125
Man-hours per farmstead	30

An expenditure of $25 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$200
10% " " " " " "	350
40% " " " " " "	40

and that:

50% of present consumers each will spend approximately	$ 70.00
10% " " " " " " "	$250.00
40% " " " " " " "	$ 25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

38% of new and present consumers will install water system and sink at average cost of	$128.00
22% of new and present consumers will install complete bath at average cost of	$ 78.

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	25
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 80,358 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1200.00
Man-hours per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $62,200,000.

Specifically for the estimate of the approximately seven and one-half million man-hours work involved in direct labor for construction of lines, it is estimated that about 30 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some eleven million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is

its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

COLO. DEL. GA. IDAHO ILL. IND. IA. AN.

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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 44.5% of Colorado farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 11.2% of Colorado farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Colorado, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Colorado to maintain its rightful place in our national economy.

It is the purpose of this section of the Colorado state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	51,436 a/
Total farms with electric service . . .	22,900 b/
Percent of farms electrified	45% b/
Total rural farm dwelling units	75,658 a/
Total rural farm dwelling units with electric service	25,595 a/
Percent rural farm dwelling units with electric service	35% a/
Total rural non-farm dwelling units . .	96,208 a/
Total rural non-farm dwelling units with electric service	70,259 a/
Percent rural non-farm dwelling units with electric service	37% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 9,886 additional consumers have been served by REA financed systems since the 1940 census)	74,233 a/ c/
Total miles of REA financed lines in state of Colorado . . . . . (as of October 31, 1943)	5,953
Total consumers served by REA financed systems in Colorado . . . . . (as of October 31, 1943)	15,044

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Western area of the U.S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	21.3
With flush toilet	11.6
With bathtub or shower	12.6

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 53,350 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	7,375,700	$22,471,000
Farmstead Wiring	1,611,200	6,679,000
Farm & Home Equipment		10,545,400
Plumbing	1,721,900	4,202,000
Totals	10,708,800	43,897,900

It is estimated that approximately 11,000 unserved rural establishments in Colorado can be served only under broadened standards of feasibility. These establishments are located in the more sparsely settled areas which represent about 28 percent of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

COLORADO

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,000.00
Man-hours of labor per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$930.00
Man-hours per mile of line	250

Potentials along existing lines - Based on assumption that 80% of potentials will be connected

Average cost of connecting potentials	$200.00
Man-hours for connecting potentials	15

FARMSTEAD WIRING

Average cost per consumer	$125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring.

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$200.00
10% " " " " " "	300.00
40% " " " " " "	75.00

and that:

50% of present consumers each will spend approximately		$ 70.00
10% " " " " " " "		250.00
40% " " " " " " "		25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of $128.00
20% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 42,500 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$845.00
Man-hours per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $22,000,000.

Specifically for the estimate of the approximately 7 million man hours work involved in direct labor for construction of lines, it is estimated that about 28 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 18 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

DEL. | . | GA. | IDAHO | LL. | IND. | IA. | AN.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present about 54.5% of Delaware farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 17.3% of Delaware farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Delaware, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Delaware to maintain its rightful place in our national economy.

It is the purpose of this section of the Delaware state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	8,994 a/
Total farms with electric service . . .	4,900 b/
Percent of farms electrified	55% b/
Total rural farm dwelling units	12,357 a/
Total rural farm dwelling units with electric service	5,005 a/
Percent rural farm dwelling units with electric service	41% a/
Total rural non-farm dwelling units . . .	25,029 a/
Total rural non-farm dwelling units with electric service . .	20,351 a/
Percent rural non-farm dwelling units with electric service	82% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 997 additional consumers have been served by REA-financed systems since the 1940 census)	11,876 a/c/
Total miles of REA-financed lines in state of Delaware . . . (as of October 31, 1943)	996
Total consumers served by REA-financed systems in Delaware . . . (as of October 31, 1943)	2,936

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the No. East area of the U.S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the STATE averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	25.1
With flush toilet	18.0
With bathtub or shower . . .	17.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A presure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 8,504 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	706,500	$2,836,800
Farmstead Wiring	256,200	1,531,300
Farm & Home Equipment	---	2,024,500
Plumbing	223,800	730,300
Totals	1,186,500	$7,122,900

It is estimated that approximately 2,375 rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately twenty per cent of the unserved rural establishments in the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the bazis of the number of U-1-c connections to date

Average cost per mile of line	$1100.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$160.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer . . . . . (includes farm equipment only)	$80.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1100.00
Man-hours per mile of line	250
Potentials along existing lines - Based on assumption that 300 potentials will be connected	
Average cost of connecting potentials . . .	$80.00
Man-hours for connecting potentials . . .	35

FARMSTEAD WIRING

Average cost per consumer	$200.00
Man-hours per farmstead	30

An expenditure of $20.00 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$268.00
10% " " " " " "	400.00
40% " " " " " "	[illegible]

and that:

50% of present consumers each will spend approximately $93.00
10% " " " " " " $175.00
40% " " " " " " $40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% of new and present consumers will install water system and sink at average cost of $128.00
15% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 7,241 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1000.00
Man-hours per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$180.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly seven million dollars.

Specifically for the estimate of the approximately seven hundred and ten thousand man-hours work involved in direct labor for construction of lines, it is estimated that about three million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some one million, two hundred thousand man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

FLA. GA. IDAHO ILL. IND. IA. KAN.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 31.5% of Florida farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935 when only 7.8% of Florida farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Florida, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Florida to maintain its rightful place in our national economy.

It is the purpose of this section of the Florida state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living:

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern area of the U.S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows;

Equipment	Per cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum Cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term-financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	19.3
With flush toilet	15.0
With bathtub or shower	15.2

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	62,248 a/
Total farms with electric service. . . .	19,600 b/
Per cent of farms electrified	32% b/
Total rural farm dwelling units	78,744 a/
Total rural farm dwelling units with electric service	17,431 a/
Per cent rural farm dwelling units with electric service	23% a/
Total rural non-farm dwelling units . .	174,213 a/
Total rural non-farm dwelling units with electric service	92,527 a/
Per cent rural non-farm dwelling units with electric service	54% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 5,469 additional consumers have been served by REA-financed systems since the 1940 census)	141,748 a/c/
Total miles of REA-financed lines in state of Florida . . . . . (as of October 31, 1943)	3,670
Total consumers served by REA-financed systems in Florida . . . . . (as of October 31, 1943)	9,673

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 91,029 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	5,235,300	$29,990,080
Farmstead Wiring	2,187,788	6,372,040
Farm & Home Equipment		12,348,520
Plumbing	2,675,500	5,602,940
Totals	10,098,588	$54,313,580

It is estimated that approximately 34% of the land area of Florida is too sparsely settled to serve under present standards of feasibility. Also, it is estimated that in the remainder of the state about 20% of the unserved rural establishments represent very low-income homes which could not be served under present standards. This totals approximately 45,250 unserved rural establishments which could be served only under broadened standards of feasibility.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

The expenditures for electrical and plumbing equipment cover the initial purchases which will be made during the first 18 months of service. No consideration is given to additional purchases over a long-time period. Estimates were based on REA saturation survey of 1941, with percentages increased enough to take care of war-time savings, group purchases, etc.

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of connections under WPB regulations to date.

Average cost per mile of line	$635.00
Man-hours of labor per mile of line	220

FARMSTEAD WIRING

Average cost per consumer	$ 50.00
Man-hours per farmstead	22

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 50.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$850.00
Man-hours per mile of line	175

Potentials along existing lines - Based on assumption that 50% of potentials will be connected

Average cost of connecting potentials	$ 66.00
Man-hours for connecting potentials	33

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	24

An expenditure of $20.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

Based on the assumption that:

50% new consumers each will spend approximately	$ 150
10% " " " " " "	350
40% " " " " " "	35

and that:

50% of present consumers each will spend approximately	60
10% " " " " " " "	200
40% " " " " " " "	25

PLUMBING EXPENDITURES

Based on the assumption that:

30% of new and present consumers will install water system and sink at average cost of	$ 128
25% of new and present consumers will install complete bath at average cost of	78

Man-hours of labor:

For installing pump and sink	$ 26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 84,612 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1020
Man-hours per mile of line	175

FARMSTEAD WIRING

Average cost per consumer	$ 70
Man-hours per farmstead	24

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $55,000,000.

Specifically for the estimate of the approximately five million man-hours work involved in direct labor for construction of lines, it is estimated that about 20 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 10 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of

rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems." (78

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high." (75

GA. IDAHO ILL. IND. IA. KAN.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 31.3% of Georgia farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935 when only 2.8% of Georgia farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and mangement, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Georgia, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Georgia to maintain its rightful place in our national economy.

It is the purpose of this section of the Georgia state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	216,033	a/
Total farms with electric service	67,700	b/
Percent of farms electrified	31%	b/
Total rural farm dwelling units	321,019	a/
Total rural farm dwelling units with electric service	50,502	a/
Per cent rural farm dwelling units with electric service	18%	a/
Total rural non-farm dwelling units . . .	179,371	a/
Total rural non-farm dwelling units with electric service . . .	99,810	a/
Per cent rural non-farm dwelling units with electric service . . .	57%	a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 24,588 additional consumers have been served by REA-financed systems since the 1940 census)	342,765	a/c/
Total miles of REA-financed lines in state of Georgia . . . (as of October 31, 1943)	20,574	
Total consumers served by REA-financed systems in Georgia . . . (as of October 31, 1943)	65,024	

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern area of the U.S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum Cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	per cent
With running water	5.0
With flush toilet	3.2
With bathtub or shower	3.3

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 253,965 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	14,541,200	$72,981,900
Farmstead Wiring	6,103,300	17,777,800
Farm & Home Equipment		37,082,800
Plumbing	7,201,000	11,062,000
Totals	27,845,500	$138,904,500

It is estimated that approximately 20% of the unserved rural establishments in Georgia can be served only under broadened standards of feasibility. This is a total of about 63,500 establishments which represent the lower income homes and those establishments which are acattered throughout the State in small isolated areas.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES:

The expenditures for electrical and plumbing equipment cover the initial purchases which will be made during the first 18 months of service. No consideration is given to additional purchases over a long-time period. Estimates were based on REA saturation survey of 1941, with percentages increased to take care of wartime savings, group purchases, etc.

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of connections under WPB regulations to date

Average cost per mile of line	$770
Man-hours of labor per mile of line	257

FARMSTEAD WIRING

Average cost per consumer	$ 50
Man-hours per farmstead	22

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 50

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750
Man-hours per mile of line	175

Potentials along existing lines - Based on assumption that 50% of potentials will be connected

Average cost of connecting potentials	$ 71
Man-hours for connecting potentials	33

FARMSTEAD WIRING

Average cost per consumer	$ 70
Man-hours per farmstead	24

An expenditure of $20 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$150
10% " " " " " "	350
40% " " " " " "	35

and that:

50% of present consumers each will spend approximately	$ 60
10% " " " " " " "	200
40% " " " " " " "	25

PLUMBING EXPENDITURES

Based on the assumption that:

20% of new and present consumers will install water system and sink at average cost of	$128
10% of new and present consumers will install complete bath at average cost of	78

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 230,038 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total farms electrified since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$900
Man-hours per mile of line	175

FARMSTEAD WIRING

Average cost per consumer	$ 70
Man-hours per farmstead	24

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $139,000,000.

Specifically for the estimate of the approximately 15 million man-hours work involved in direct labor for construction of lines, it is estimated that about 60 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 28 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measureable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 74.2% of Idaho farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 29.8% of Idaho farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Idaho, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Idaho to maintain its rightful place in our national economy.

It is the purpose of this section of the Idaho state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	43,663 a/
Total farms with electric service . . .	32,400 b/
Percent of farms electrified	74% b/
Total rural farm dwelling units	53,926 a/
Total rural farm dwelling units with electric service	31,487 a/
Percent rural farm dwelling units with electric service	68% a/
Total rural non-farm dwelling units . .	45,934 a/
Total rural non-farm dwelling units with electric service	36,647 a/
Percent rural non-farm dwelling units with electric service	81% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 2,874 additional consumers have been served by REA-financed systems since the 1940 census)	30,831 a/ c/
Total miles of REA-financed lines in state of Idaho . . . (as of October 31, 1943)	2,983
Total consumers served by REA-financed systems in Idaho . . . (as of October 31, 1943)	6,546

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Western area of the U.S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	31.3
With flush toilet	16.9
With bathtub or shower	18.3

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 22,376 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	2,339,200	$9,235,900
Farmstead Wiring	672,500	2,795,200
Farm & Home Equipment		4,312,900
Plumbing	1,065,900	1,818,800
Totals	4,077,600	$18,162,800

It is estimated that approximately 5592 unserved rural establishments in Idaho can be served only under broadened standards of feasibility. These establishments represent approximately twenty per cent of the unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1250
Man-hours of labor per mile of line	400

FARMSTEAD WIRING

Average cost per consumer	$ 100
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1000
Man-hours per mile of line	300
Potentials along existing lines - Based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$225
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 125
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 200
10% " " " " " "	350
40% " " " " " "	40

and that:

50% of present consumers each will spend approximately	$ 70
10% " " " " " " "	250
40% " " " " " " "	25

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

38% of new and present consumers will install water system and sink at average cost of	$ 128
22% of new and present consumers will install complete bath at average cost of	$ 78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	25
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 18,875 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$ 1000
Man-hours per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 125
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followd so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $18,000,000.

Specifically for the estimate of the approximately two million man-hours work involved in direct labor for construction of lines, it is estimated that about 8 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 4 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance. . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrific tion, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

ILL. IND. IA. KAN.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 52.9% of Illinois farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 12.3% of Illinois farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a war-time to a peace-time economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Illinois, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Illinois to maintain its rightful place in our national economy.

It is the purpose of this section of the Illinois state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	213,439a/
Total farms with electric service . . .	113,000b/
Percent of farms electrified	53%b/
Total rural farm dwelling units	259,758a/
Total rural farm dwelling units with electric service	98,525a/
Percent rural farm dwelling units with electric service	39%a/
Total rural non-farm dwelling units . .	333,505a/
Total rural non-farm dwelling units with electric service	283,732a/
Percent rural non-farm dwelling units with electric service	86%a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 22769 additional consumers have been served by REA financed systems since the 1940 census)	206,982a/c/
Total miles of REA financed lines in state of Illinois . . . . . (as of October 31, 1943)	19,399
Total consumers served by REA financed systems in Illinois . . . . . (as of October 31, 1943)	50,547

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the No. Central Area of the U.S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	89.0
Radio	90.9
Washing Machine	79.1
Refrigerator	43.1
Toaster	44.4
Hot Plate	19.6
Vacuum cleaner (floor)	28.0
Motor up to 1 HP	28.7
Coffee Maker	7.8
Water systems and pump jacks	24.0
Cream separator	19.0
Poultry lighting	18.9
Range	5.4
Brooder	10.3
Milking Machine	5.9
Electric Fence	4.3
Motor 1 HP & over	3.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	16.1
With flush toilet	13.0
With bathtub or shower	13.4

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 167,275 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	10,478,900	$56,556,500
Farmstead Wiring	6,549,800	32,794,000
Farm & Home Equipment		39,209,000
Plumbing	7,953,000	13,357,000
Totals	24,981,700	$141,916,500

It is estimated that approximately 15,605 unserved rural establishments in Illinois can be served only under broadened standards of feasibility. These establishments represent approximately one-tenth of the total unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,390.00
Man-hours of labor per mile of line	270

FARMSTEAD WIRING

Average cost per consumer	$ 150.00
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 100.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 962.00
Man-hours per mile of line	200
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$ 175.00
Man-hours for connecting potentials	27

FARMSTEAD WIRING

Average cost per consumer	$ 200.00
Man-hours per farmstead	40

An expenditure of $50.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 250.00
10% " " " " " "	350.00
40% " " " " " "	75.00

and that:

50% of present consumers each will spend approximately	$ 80.00
10% " " " " " " "	250.00
40% " " " " " " "	40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$128.00
20% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 136,800 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$932.00
Man-hours per mile of line	170.00

FARMSTEAD WIRING

Average cost per consumer	$200.00
Man-hours per farmstead	40.00

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $142,000,000.

Specifically for the estimate of the approximately 10 million man hours work involved in direct labor for construction of lines, it is estimated that about 60 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 25 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage on REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are

substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined view of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

IND. IA. AN.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 68.0% of Indiana farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 11.7% of Indiana farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a war-time to a peace-time economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Indiana, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Indiana to maintain its rightful place in our national economy.

It is the purpose of this section of the Indiana state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	184,549a/
Total farms with electric service	125,600b/
Percent of farms electrified	68%b/
Total rural farm dwelling units	222,467a/
Total rural farm dwelling units with electric service	108,000a/
Percent rural farm dwelling units with electric service	49%a/
Total rural non-farm dwelling units . .	228,338a/
Total rural non-farm dwelling units with electric service	190,809a/
Percent rural non-farm dwelling units with electric service	85%a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 24725 additional consumers have been served by REA financed systems since the 1940 census)	149,056a/c/
Total miles of REA financed lines in state of Indiana . . . . . (as of October 31, 1943)	22,036
Total consumers served by REA financed systems in Indiana . . . . . (as of October 31, 1943)	69,639

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the N. Central Area of the U.S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	89.0
Radio	90.9
Washing Machine	79.1
Refrigerator	43.1
Toaster	44.4
Hot Plate	19.6
Vacuum cleaner (floor)	28.0
Motor up to 1 HP	28.7
Coffee Maker	7.8
Water systems and pump jacks	24.0
Cream separator	19.0
Poultry lighting	18.9
Range	5.4
Brooder	10.3
Milking Machine	5.9
Electric Fence	4.3
Motor, 1 HP & over	3.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	17.9
With flush toilet	12.0
With bathtub or shower	12.1

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 87,000 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	6,206,000	$29,752,000
Farmstead Wiring	4,142,000	21,136,000
Farm & Home Equipment		27,424,000
Plumbing	3,259,000	10,631,000
Totals	13,607,000	88,943,000

It is estimated that approximately 18,650 unserved rural establishments in Indiana can be served only under broadened standards of feasibility. These establishments represent approximately 15% of the unserved rural establishments of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1100
Man-hours of labor per mile of line	260

FARMSTEAD WIRING

Average cost per consumer	$150
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$100

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$800
Man-hours per mile of line	180

Potentials along existing lines - Based on assumption that 50% of potentials will be connected

Average cost of connecting potentials	$125
Man-hours for connecting potentials	16

FARMSTEAD WIRING

Average cost per consumer	$200
Man-hours per farmstead	40

An expenditure of $50.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$250
10% " " " " " "	350
40% " " " " " "	75

and that:

50% of present consumers each will spend approximately	$ 80
10% " " " " " "	$250
40% " " " " " " "	$ 40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of $128
25% of new and present consumers will install complete bath at average cost of $ 78
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 87,140 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$780
Man-hours per mile of line	160

FARMSTEAD WIRING

Average cost per consumer	$200
Man-hours per farmstead	40

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $89,000,000.

Specifically for the estimate of the approximately 6 million man hours work involved in direct labor for construction of lines, it is estimated that about 24 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 14 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of

rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 50.7% of Iowa farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 14.4% of Iowa farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a war-time to a peace-time economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Iowa, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Iowa to maintain its rightful place in our national economy.

It is the purpose of this section of the Iowa state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	213,318a/
Total farms with electric service . . .	108,100b/
Percent of farms electrified	51%b/
Total rural farm dwelling units	236,741a/
Total rural farm dwelling units with electric service	92,166a/
Percent rural farm dwelling units with electric service	40%a/
Total rural non-farm dwelling units . .	168,924a/
Total rural non-farm dwelling units with electric service	149,665a/
Percent rural non-farm dwelling units with electric service	90%a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 25,857 additional consumers have been served by REA financed systems since the 1940 census)	160,415a/c/
Total miles of REA financed lines in state of Iowa . . . . . (as of October 31, 1943)	23,927
Total consumers served by REA financed systems in Iowa . . . . . (as of October 31, 1943)	55,033

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the N.Central area of the U.S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	89.0
Radio	90.9
Washing Machine	79.1
Refrigerator	43.1
Toaster	44.4
Hot Plate	19.6
Vacuum cleaner (floor)	28.0
Motor up to 1 HP	28.7
Coffee Maker	7.8
Water systems and pump jacks	24.0
Cream separator	19.0
Poultry lighting	18.9
Range	5.4
Brooder	10.3
Milking Machine	5.9
Electric Fence	4.3
Motor, 1 HP & over	3.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	21.5
With flush toilet	14.9
With bathtub or shower	15.5

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 114,350 rural establishments which might be served under present standards of feasibility.

These totals are as follows:	Man-hours	Cost
Line Construction	8,566,000	$39,486,000
Farmstead Wiring	4,561,000	22,870,000
Farm & Home Equipment		29,950,000
Plumbing	6,671,000	10,886,000
Totals	19,798,000	$103,192,000

It is estimated that approximately 20,200 unserved rural establishments in Iowa can be served only under broadened standards of feasibility. These establishments represent approximately 15% of the unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,192.00
Man-hours of labor per mile of line	267

FARMSTEAD WIRING

Average cost per consumer	$ 150.00
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 100.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 825.00
Man-hours per mile of line	200
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$ 150.00
Man-hours for connecting potentials	27

FARMSTEAD WIRING

Average cost per consumer	$ 200.00
Man-hours per farmstead	34

An expenditure of $50.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 250.00
10% " " " " " "	350.00
40% " " " " " "	75.00

and that:

50% of present consumers each will spend approximately	$ 80.00
10% " " " " " " "	250.00
40% " " " " " " "	40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$128.00
20% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 84,950 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$800.00
Man-hours per mile of line	170

FARMSTEAD WIRING

Average cost per consumer	$185.00
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits or rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $103,000,000.

Specifically for the estimate of the approximately 9 million man hours work involved in direct labor for construction of lines, it is estimated that about 54 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 20 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of

rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

Suggested Report
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RURAL ELECTRIFICATION

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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 25% of Kansas farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935 when only 7.6% of Kansas farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Kansas, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Kansas to maintain its rightful place in our national economy.

It is the purpose of this section of the Kansas state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	156,327 a/
Total farms with electric service . . .	39,1[illegible] b/
Per cent of farms electrified	25% b/
Total rural farm dwelling units . . .	174,767 a/
Total rural farm dwelling units with electric service	46,646 a/
Per cent rural farm dwelling units with electric service	27.3% a/
Total rural non-farm dwelling units . .	135,935 a/
Total rural non-farm dwelling units with electric service	114,572 a/
Per cent rural non-farm dwelling units with electric service . .	85.4% a/
Total rural farm and non-farm dwelling units without electric service . . (a total of 9023 additional consumers have been served by REA financed systems since 1940 census)	145,591 a/c/
Total miles of REA financed lines in Kansas . . . . (as of October 31, 1943)	9356
Total consumers served by REA financed systems in Kansas . . . . . (as of October 31, 1943)	16940

a/ 1940 Census

b/ REA - 1943 Report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Western States having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum Cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units

	Per cent
With running water	15.7
With flush toilet	10.0
With bathtub or shower . .	11.6

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fine protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 121,985 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	8,931,225	$39,458,825
Farmstead Wiring	3,665,940	15,248,500
Farm and Home Equipment		21,110,000
Plumbing	5,642,700	8,148,750
Totals	18,560,435	$83,966,075

It is estimated that approximately 14,600 unserved establishments in Kansas can be served only under broadened standards of feasibility. These establishments are located in twenty-eight counties which represent approximately twenty-five per cent of the total area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$ 925.00
Man-hours of labor per mile of line	225

FARMSTEAD WIRING

Average cost per consumer	$ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 815.00
Man-hours per mile of line	200
Potentials along existing lines. Total number based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$ 175.00
Man-hours for connecting potentials	15

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers will each spend approximately	$ 200.00
10% " " " " " "	325.00
40% " " " " " "	40.00

and that:

50% of present consumers will each spend approximately	70.00
10% " " " " " "	250.00
40% " " " " " "	25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$128.00
20% of new and present consumers will install complete bath at average cost of	7[illegible].00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	25
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 106,450 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after substracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility

Average cost per mile of line	$785.00
Man-hours per mile of line	200

FARMSTEAD WIRING

Average cost per consumer	$125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

I. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $84,000,000.

Specifically for the estimate of the approximately 9 million man-hours work involved in direct labor for construction of lines, it is estimated that about 36 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 19 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contigent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

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important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The application of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

KY. LA. ME. MD. MICH. MINN. MISS. MO. MONT. NEBR.

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With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 22.9% Kentucky farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 3.0% Kentucky farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Kentucky, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Kentucky to maintain its rightful place in our national economy.

It is the purpose of this section of the Kentucky state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole;

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	252,894	a/
Total farms with electric service	57,900	b/
Per cent of farms electrified	23%	b/
Total rural farm dwelling units.	293,774	a/
Total rural farm dwelling units with electric service	43,349	a/
Per cent rural farm dwelling units with electric service	15%	a/
Total rural non-farm dwelling units . . .	187,475	a/
Total rural non-farm dwelling units with electric service . . .	111,483	a/
Per cent rural non-farm dwelling units with electric service . . .	60%	a/
Total rural farm and non-farm dwelling units without electric service (a total of 22,227 additional consumers have been served by REA-financed systems since the 1940 census)	322,035	a/ c/
Total miles of REA-financed lines in state of Kentucky . . . (as of October 31, 1943)	12,814	
Total consumers served by REA-financed systems in Kentucky . . . . . (as of October 31, 1943)	43,076	

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census.

2. The percentage of electrical equipment ownership on REA-financed systems in the No. East area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	4.2
With flush toilet	3.1
With bathtub or shower	3.1

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 297,605 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	16,098,246	$90,596,700
Farmstead Wiring	8,019,100	21,407,900
Farm & Home Equipment		44,862,250
Plumbing	7,282,599	24,756,734
Totals	31,399,945	$181,623,584

It is estimated that approximately 32,000 unserved rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately ten per cent of the unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION. (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$790
Man-hours of labor per mile of line	264

FARMSTEAD WIRING

Average cost per consumer	$ 60
Man-hours per farmstead	23

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 60

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$870
Man-hours per mile of line	182
Potentials along existing lines - Based on assumption that 1/2 of potentials will be connected	
Average cost of connecting potentials	$ 71
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 80
Man-hours per farmstead	30

An expenditure of $20 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$208
10% " " " " " "	260
40% " " " " " "	150

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and that:

50% of present consumers each will spend approximately	$ 75
10% " " " " " " "	165
40% " " " " " " "	40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% of new and present consumers will install water system and sink at average cost of	$ 128
5% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 242,410 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1042
Man-hours per mile of line	182

FARMSTEAD WIRING

Average cost per consumer	$ 80
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on estimates:

50% of new and present consumers will install water system and sink at average cost of	$ 128
25% of new and present consumers will install complete bath at average cost of	78

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $182,000,000.

Specifically for the estimate of the approximately 16 million man-hours work involved in direct labor for construction of lines, it is estimated that about 64 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 31½ million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

LA. ME. MD. MICH. MINN. MISS. MO. MONT. NEBR.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 16.1% of Louisiana farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 1.7% of Louisiana farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Louisiana, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Louisiana to maintain its rightful place in our national economy.

It is the purpose of this section of the Louisiana state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	150,007 a/
Total farms with electric service . . .	24,200 b/
Percent of farms electrified	16% b/
Total rural farm dwelling units	204,777 a/
Total rural farm dwelling units with electric service	19,735 a/
Percent rural farm dwelling units with electric service	10% a/
Total rural non-farm dwelling units . .	143,392 a/
Total rural non-farm dwelling units with electric service	68,694 a/
Percent rural non-farm dwelling units with electric service	49% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 8,337 additional consumers have been served by REA-financed systems since the 1940 census)	256,429 a/ c/
Total miles of REA-financed lines in state of Louisiana . . . . . (as of October 31, 1943)	5,625
Total consumers served by REA-financed systems in Louisiana . . . . . (as of October 31, 1943)	15,316

a/ 1940 Census

b/ REA-1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern area of the U. S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per Cent
With running water	5.9
With flush toilet	3.9
With bathtub or shower	4.6

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 148,852 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	10,546,400	$29,775,400
Farmstead Wiring	3,709,400	10,394,000
Farm & Home Equipment		24,233,000
Plumbing	5,116,200	7,714,100
Totals	19,372,000	$72,116,500

It is estimated that approximately 99,240 rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately 40% of the unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

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I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$700
Man-hours of labor per mile of line	240

FARMSTEAD WIRING

Average cost per consumer	$45
Man-hours per farmstead	20

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$50

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$600
Man-hours per mile of line	220
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$150
Man-hours for connecting potentials	10

FARMSTEAD WIRING

Average cost per consumer	$60
Man-hours per farmstead	24

An expenditure of $30 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$200
10% " " " " " "	300
40% " " " " " "	50

and that:

50% of present consumers each will spend approximately	$70
10% " " " " " " "	$250
40% " " " " " " "	$40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% of new and present consumers will install water system and sink at average cost of $128
18% of new and present consumers will install complete bath at average cost of $78
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 142,494 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$560
Man-hours per mile of line	200

FARMSTEAD WIRING

Average cost per consumer	$70
Man-hours per farmstead	25

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $72,000,000.

Specifically for the estimate of the approximately eleven million man-hours work involved in direct labor for construction of lines, it is estimated that about 44 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some nineteen million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

ME. MD. MICH. MINN. MISS. MO. MONT. NEBR.

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RURAL ELECTRIFICATION

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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 62.1% Maine farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 33.3% Maine farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Maine, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Maine to maintain its rightful place in our national economy.

It is the purpose of this section of the Maine state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	38,980	a/
Total farms with electric service	24,200	b/
Per cent of farms electrified	62%	b/
Total rural farm dwelling units	45,448	a/
Total rural farm dwelling units with electric service	22,819	a/
Per cent rural farm dwelling units with electric service	51%	a/
Total rural non-farm dwelling units	120,424	a/
Total rural non-farm dwelling units with electric service	92,806	a/
Per cent rural non-farm dwelling units with electric service	79%	a/
Total rural farm and non-farm dwelling units without electric service (a total of 857 additional consumers have been served by REA-financed systems since the 1940 census)	49,465	a/c/
Total miles of REA-financed lines in state of Maine (as of October 31, 1943)	383	
Total consumers served by REA-financed systems in Maine (as of October 31, 1943)	1,034	

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the No. East area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	33.4
With flush toilet	20.0
With bathtub or shower	18.0

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 38,715 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	3,021,100	$12,067,800
Farmstead Wiring	1,162,050	3,871,700
Farm & Home Equipment		5,001,000
Plumbing	1,250,100	4,053,300
Totals	5,433,250	$24,993,800

It is estimated that approximately 9,893 unserved rural establishments in Maine can be served only under broadened standards of feasibility. These establishments represent approximately 20 per cent of the total unserved rural establishments in the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1200
Man-hours of labor per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 80
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 80

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1200
Man-hours per mile of line	275

Potentials along existing lines - Based on assumption that 564 potentials will be connected

Average cost of connecting potentials	$ 90
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$100
Man-hours per farmstead	30

An expenditure of $20 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring.

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$165
10% " " " " " "	225
40% " " " " " "	50

and that:

50% of present consumers each will spend approximately	$93
10% " " " " " " "	175
40% " " " " " " "	40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of	$128
20% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 37,758 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1100
Man-hours per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$100
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $25,000,000.

Specifically for the estimate of the approximately three million man-hours work involved in direct labor for construction of lines, it is estimated that about 12 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some five and one half million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

MD. MICH. MINN. MISS. MO. MONT. NEBR.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity of low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 58.1% of Maryland farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935 when only 15.3% of Maryland farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and mangement, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Maryland, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Maryland to maintain its rightful place in our national economy.

It is the purpose of this section of the Maryland state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	42,175	a/
Total farms with electric service	24,500	b/
Per cent of farms electrified.	58%	b/
Total rural farm dwelling units	59,179	a/
Total rural farm dwelling units with electric service	24,719	a/
Per cent rural farm dwelling units with electric service	43%	a/
Total rural non-farm dwelling units	143,734	a/
Total rural non-farm dwelling units with electric service	114,686	a/
Per cent rural non-farm dwelling units with electric service	81%	a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 3,121 additional consumers have been served by REA-financed systems since the 1940 census)	62,337	a/c/
Total miles of REA-financed lines in state of Maryland . . . (as of October 31, 1943)	1,637	
Total consumers served by REA-financed systems in Maryland . . . (as of October 31, 1943)	4,497	

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the No. East area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	30.0
With flush toilet	22.0
With bathtub or shower	22.1

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 51,736 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	5,010,700	$19,032,100
Farmstead Wiring	1,553,200	8,794,800
Farm & Home Equipment		9,534,900
Plumbing	1,466,200	4,719,900
Totals	8,030,100	$42,081,700

It is estimated that approximately 7,480 unserved rural establishments in Maryland can be served only under broadened standards of feasibility. These establishments represent approximately 12% of the unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1100.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 150.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 80.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1100.00
Man-hours per mile of line	250

Potentials along existing lines - Based on assumption that 300 potentials will be connected

Average cost of connecting potentials	$ 80.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 170.00
Man-hours per farmstead	30

An expenditure of $20.00 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50%	new consumers	each will	spend	approximately		$238.00
10%	"	"	"	"	"	$320.00
40%	"	"	"	"	"	$ 60.00

and that:

50% of present consumers each will spend approximately	$ 93
10% " " " " " " "	175
40% " " " " " " "	40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

30% of new and present consumers will install water system and sink at average cost of	$ 128
20% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	$ 26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 50,161 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1000
Man-hours per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 170
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly 42 million dollars.

Specifically for the estimate of the approximately five million man-hours work involved in direct labor for construction of lines, it is estimated that about 20 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some eight million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on

health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 80.5% of Michigan farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 21.4% of Michigan farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Michigan, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Michigan to maintain its rightful place in our national economy.

It is the purpose of this section of the Michigan state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	187,589 a/
Total farms with electric service . . .	151,000 b/
Percent of farms electrified	81% b/
Total rural farm dwelling units	237,925 a/
Total rural farm dwelling units with electric service	160,622 a/
Percent rural farm dwelling units with electric service	69% a/
Total rural non-farm dwelling units . .	322,921 a/
Total rural non-farm dwelling units with electric service	283,138 a/
Percent rural non-farm dwelling units with electric service	89% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 9,615 additional consumers have been served by REA-financed systems since the 1940 census)	113,421 a/c/
Total miles of REA-financed lines in state of Michigan . . . . . (as of October 31, 1943)	9,491
Total consumers served by REA-financed systems in Michigan . . . . . (as of October 31, 1943)	30,493

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the No. Central area of the U.S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	89.0
Radio	90.9
Washing Machine	79.1
Refrigerator	43.1
Toaster	44.4
Hot Plate	19.6
Vacuum cleaner (floor)	28.0
Motor up to 1 HP	28.7
Coffee Maker	7.8
Water systems and pump jacks	24.0
Cream separator	19.0
Poultry lighting	18.9
Range	5.4
Brooder	10.3
Milking Machine	5.9
Electric Fence	4.3
Motor, 1 HP & over	3.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will uncoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	28.2
With flush toilet	16.8
With bathtub or shower	16.3

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 71,196 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line Construction	4,483,000	$19,561,600
Farmstead Wiring	2,439,700	10,802,200
Farm & Home Equipment		16,672,900
Plumbing	3,692,000	6,819,000
Totals	10,614,700	$53,855,700

It is estimated that approximately 21,080 unserved rural establishments in Michigan can be served only under broadened standards of feasibility. These establishments represent approximately 35 per cent of the unserved rural establishments in the upper Peninsula of the State and approximately 20 per cent of the unserved rural establishments in the remainder of the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

MICHIGAN

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1100
Man-hours of labor per mile of line	260

FARMSTEAD WIRING

Average cost per consumer	$ 125
Man-hours per farmstead	32

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 85

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 850
Man-hours per mile of line	210

Potentials along existing lines - Based on assumption that 50% of potentials will be connected

Average cost of connecting potentials	$ 140
Man-hours for connecting potentials	20

FARMSTEAD WIRING

Average cost per consumer	$ 150
Man-hours per farmstead	34

An expenditure of $50.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 225
10% " " " " " "	350
40% " " " " " "	75

and that:

50% of present consumers each will spend approximately	$ 80.
10% " " " " " " "	250.
40% " " " " " " "	40.

(Source REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

38% of new and present consumers will install water system and sink at average cost of	$128
22% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 61,548 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$825
Man-hours per mile of line	190

FARMSTEAD WIRING

Average cost per consumer	$150
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the line. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $47,000,000.

Specifically for the estimate of the approximately 4 million man-hours work involved in direct labor for construction of lines, it is estimated that about 16 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 9 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater disperson of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

MINN. MISS. MO. MONT. NEBR.

Suggested Report
for
RURAL ELECTRIFICATION

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 38.9% of Minnesota farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935 when only 6.8% of Minnesota farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Minnesota, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Minnesota to maintain its rightful place in our national economy.

It is the purpose of this section of the Minnesota state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	197,351	a/
Total farms with electric service . . .	76,800	b/
Percent of farms electrified	39%	b/
Total rural farm dwelling units	218,580	a/
Total rural farm dwelling units with electric service	64,273	a/
Percent rural farm dwelling units with electric service	30%	a/
Total rural non-farm dwelling units . .	159,769	a/
Total rural non-farm dwelling units with electric service	128,932	a/
Percent rural non-farm dwelling units with electric service	82%	a/
Total rural farm and non-farm dwelling units without electric service. . . . (a total of 26965 additional consumers have been served by REA financed systems since the 1940 census)	181,930	a/c/
Total miles of REA financed lines in state of Minnesota . . . . . (as of October 31, 1943)	27,328	
Total consumers served by REA financed systems in Minnesota . . . . . (as of October 31, 1943)	58,858	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the North Central area of the United States having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	89.0
Radio	90.9
Washing Machine	79.1
Refrigerator	43.1
Toaster	44.1
Hot Plate	19.6
Vacuum cleaner (floor)	28.0
Motor up to 1 HP	28.7
Coffee Maker	7.8
Water systems and pump jacks	24.0
Cream separator	19.0
Poultry lighting	18.9
Range	5.4
Brooder	10.3
Milking Machine	5.9
Electric Fence	4.3
Motor, 1 HP & over	3.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	12.2
With flush toilet	7.9
With bathtub or shower	7.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 105,330 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	11,044,100	$54,298,200
Farmstead Wiring	5,601,800	28,070,000
Farm & Home Equipment		34,446,700
Plumbing	7,114,000	10,866,000
Totals	23,759,900	$127,680,900

It is estimated that approximately 26,520 unserved rural establishments in Minnesota can be served only under broadened standards of feasability. These establishments represent approximately 15% of the unserved establishments of the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,250
Man-hours of labor per mile of line	300

FARMSTEAD WIRING

Average cost per consumer	$150
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$100

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$960
Man-hours per mile of line	180
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$160
Man-hours for connecting potentials	30

FARMSTEAD WIRING

Average cost per consumer	$200
Man-hours per farmstead	40

An expenditure of $50 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$250
10% " " " " " "	350
40% " " " " " "	75

and that:

50% of present consumers each will spend approximately	$ 80.00
10% " " " " " " "	250.00
40% " " " " " " "	40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

30% of new and present consumers will install water system and sink at average cost of	$128.00
20% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 105,330 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$890.00
Man-hours per mile of line	180

FARMSTEAD WIRING

Average cost per consumer	$200.00
Man-hours per farmstead	40

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

b. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $128,000,000.

Specifically for the estimate of the approximately 11 million man hours work involved in direct labor for construction of lines, it is estimated that about 44 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 24 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

MISS.
MO.
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NEBR.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 15.2 of Mississippi farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 0.9% of Mississippi farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Mississippi, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Mississippi to maintain its rightful place in our national economy.

It is the purpose of this section of the Mississippi state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost, non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	291,092a/
Total farms with electric service . . .	44,300b/
Percent of farms electrified	15%b/
Total rural farm dwelling units	335,012a/
Total rural farm dwelling units with electric service	27,889a/
Percent rural farm dwelling units with electric service	9%a/
Total rural non-farm dwelling units . .	99,130a/
Total rural non-farm dwelling units with electric service	44,090a/
Percent rural non-farm dwelling units with electric service	45%a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 15658 additional consumers have been served by REA-financed systems since the 1940 census)	355,244a/c/
Total miles of REA-financed lines in state of Mississippi . . . . (as of October 31, 1943)	13,237
Total consumers served by REA-financed systems in Mississippi . . . . (as of October 31, 1943)	43,617

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern area of the U. S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	3.2
With flush toilet	2.4
With bathtub or shower	2.5

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 252,764 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	15,143,436	$84,785,207
Farmstead Wiring	6,080,754	17,693,270
Farm & Home Equipment	-	35,251,885
Plumbing	6,651,666	10,207,470
Totals	27,875,856	$147,937,832

It is estimated that approximately 25% of the unserved rural establishments in Mississippi can be served only under broadened standards of feasibility. This is a total of about 84,250 establishments which represent the lower income homes and those establishments which are scattered throughout the state in small isolated areas.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

The expenditures for electrical and plumbing equipment cover the initial purchases which will be made during the first 18 months of service. No consideration is given to additional purchases over a long-time period. Estimates were based on REA saturation survey of 1941, with percentages increased to take care of war-time savings, group purchases, etc.

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of connections under WPB regulations to date.

Average cost per mile of line	$768.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 50.00
Man-hours per farmstead	22

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 50.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$757.00
Man-hours per mile of line	182
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$ 65.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	24

An expenditure of $20.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring.

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50%	new	consumers	each	will	spend	approximately $150.00
10%	"	"	"	"	"	" $350.00
40%	"	"	"	"	"	" $ 35.00

and that:

50%	of present	consumers	each	will	spend	approximately	$60.00
10%	"	"	"	"	"	"	$200.00
40%	"	"	"	"	"	"	$25.00

PLUMBING EXPENDITURES

Based on the assumption that:

20% of new and present consumers will install water system and sink at average cost of	$128.00
10% of new and present consumers will install complete bath at average cost of	$ 78.00

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED

The total of 235, 435 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total farms electrified since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1042.00
Man-hours per mile of line	182

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	24

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly 148 million dollars.

Specifically for the estimate of the approximately 15 million man-hours work involved in direct labor for construction of lines, it is estimated that about 60 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 28 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical

well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity. . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
for
RURAL ELECTRIFICATION

Suggested for inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 23.4% of Missouri farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 6.4% of Missouri farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Missouri, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Missouri to maintain its rightful place in our national economy.

It is the purpose of this section of the Missouri state report to describe the present status of rural electrification in the state, and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	256,100	a/
Total farms with electric service . . .	59,800	b/
Percent of farms electrified	23%	b/
Total rural farm dwelling units	311,841	a/
Total rural farm dwelling units with electric service	48,807	a/
Percent rural farm dwelling units with electric service	16%	a/
Total rural non-farm dwelling units . .	219,366	a/
Total rural non-farm dwelling units with electric service	164,313	a/
Percent rural non-farm dwelling units with electric service	76%	a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 22,765 additional consumers have been served by REA financed systems since the 1940 census)	312,578	a/ c/
Total miles of REA financed lines in state of Missouri . . . (as of October 31, 1943)	17,198	
Total consumers served by REA financed systems in Missouri . . . (as of October 31, 1943)	40,546	

a/ 1940 Census
b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Southern area of the U.S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	6.3
With flush toilet	4.6
With bathtub or shower	4.8

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm valley.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 245,868 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	22,644,900	$63,712,000
Farmstead Wiring	7,726,000	30,983,000
Farm & Home Equipment		54,523,000
Plumbing	7,648,100	14,938,000
Totals	38,019,000	164,156,000

It is estimated that approximately 48,930 unserved rural establishments in Missouri can be served only under broadened standards of feasibility. These establishments represent approximately twenty per cent of the total unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$950
Man-hours of labor per mile of line	300

FARMSTEAD WIRING

Average cost per consumer	$100
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$100

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750
Man-hours per mile of line	280
Potentials along existing lines - Based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$175
Man-hours for connecting potentials	15

FARMSTEAD WIRING

Average cost per consumer	$125
Man-hours per farmstead	30

An expenditure of $50 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$250
10% " " " " " "	350
40% " " " " " "	75

and that:

50% of present consumers each will spend approximately	$ 80
10% " " " " " "	250
40% " " " " " " "	50

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% of new and present consumers will install water system and sink at average cost of	$128
18% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 195,720 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$700
Man-hours per mile of line	260

FARMSTEAD WIRING

Average cost per consumer	$125
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of indirect to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $164,000,000.

Specifically for the estimate of the approximately 23 million man hours work involved in direct labor for construction of lines, it is estimated that about 92 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 38 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are

important contributions to sanitation . . .Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, It will no doubt increase rapidly immediately after the war. At present, about 24.6% of Montana farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 5.5% of Montana farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extention of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Montana, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Montana to maintain its rightful place in our national economy.

It is the purpose of this section of the Montana state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available.

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number of farms	41,823 a/
Total farms with electric service.	10,300 b/
Per cent of farms electrified	24.6% b/
Total rural farm dwelling units	53,921 a/
Total rural farm dwelling units with electric service . . .	14,783 a/
Per cent rural farm dwelling units with electric service . . .	27.8% a/
Total rural non-farm dwelling units	56,301 a/
Total rural non-farm dwelling units with electric service . . .	43,828 a/
Per cent rural non-farm dwelling units with electric service	79.0% a/
Total rural farm and non-farm dwelling units without electric service . . (a total of 2643 additional consumers have been served by REA-financed systems since the 1940 census)	50,845 a/c/
Total miles of REA-financed lines in Montana . (as of Oct. 31, 1943)	3049
Total consumers served by REA-financed systems in Montana . . . . (as of Oct. 31, 1943)	7125

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Western States having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum Cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units

	Per cent
With running water	14.7
With flush toilet	8.4
With bathtub or shower	9.1

A modern water sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 39,710 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	$3,675,150	$15,965,750
Farmstead wiring	1,192,150	4,963,750
Farm & Home Equipment		8,661,750
Plumbing	1,743,685	2,984,140
Totals	$6,611,885	$32,575,390

It is estimated that approximately 8,290 unserved establishments in Montana can be served only under broadened standards of feasibility. These establishments are located in eleven counties which represent approximately twenty per cent of the total area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,250.00
Man-hours of labor per mile of line	350

FARMSTEAD WIRING

Average cost per consumer	$ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1,000.00
Man-hours per mile of line	275
Potentials along existing lines. Total number based on assumption that 80% of potentials will be connected	
Average cost of connecting potentials	$ 325.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers will each spend approximately	$ 240.00
10% " " " " " "	400.00
40% " " " " " "	75.00

and that:

50% of present consumers will each spend approximately	$ 70.00
10% " " " " " " "	250.00
40% " " " " " " "	25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$ 128.00
20% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	25
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 33,390 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after substracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1000.00
Man-hours per mile of line	225

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $35,575,000.

Specifically for the estimate of the approximately 4 million man hours work involved in direct labor for construction of lines, it is estimated that about 16 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 7 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are

important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar program to insure full employment at wage levels commensurate with American living standards there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 25.8% of Nebraska farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 7.1% of Nebraska farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically In Nebraska, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Nebraska to maintain its rightful place in our national economy.

It is the purpose of this section of the Nebraska state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available.

2. Optimum application of electricity to farm production and farm family living.

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement.

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	121,032	a/
Total farms with electric service	31,300	b/
Percent of farms electrified	25.8%	b/
Total rural farm dwelling units	139.495	a/
Total rural farm dwelling units with electric service .	39,201	a/
Percent rural farm dwelling units with electric service .	28.5%	a/
Total rural non-farm dwelling units	94,515	a/
Total rural non-farm dwelling units with electric service. .	82,011	a/
Percent rural non-farm dwelling units with electric service .	87.[illegible]%	a/
Total rural farm and non-farm dwelling units without electric service . . . . . (A total of 8330 additional consumers have been served by REA financed systems since the 1940 census)	110,656	a/ c/
Total miles of REA financed lines in Nebraska as of October 31, 1943	10,513	
Total consumers served by REA financed systems in Nebraska . . . . . as of October 31, 1943	19,344	

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census.

2. The percentage of electrical equipment ownership on REA financed systems in the Western States having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units

	Percent
With running water	22.3
With flush toilet	12.4
With bathtub or shower	14.1

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in time of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 91,705 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-Hours	Cost
Line construction	7,365,375	$29,533,755
Farmstead Wiring	2,760,150	11,463,125
Farm & Home Equipment		16,112,527
Plumbing	4,214,430	6,338,921
Totals	14,339,655	$63,447,728

It is estimated that approximately 12,000 unserved rural establishments in Nebraska can be served only under broadened standards of feasibility. These establishments represent about 12% of the total unserved rural establishments and are located in eighteen counties which constitute thirty per cent of the total area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$ 925.00
Man-hours of labor per mile of line	225

FARMSTEAD WIRING

Average cost per consumer	100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 815.00
Man-hours per mile of line	200
Potentials along existing lines. Total number based on assumption that 75% of potentials will be connected.	
Average cost of connecting potentials	175.00
Man-hours for connecting potentials	15

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50%	new consumers	will each	spend	approximately		$200.00
10%	"	"	"	"	"	325.00
40%	"	"	"	"	"	40.00

and that:

50% of present consumers will each spend approximately	$ 70.00
10% " " " " " " "	250.00
40% " " " " " " "	25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$128.00
20% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.

Man-hours of labor:

For installing pump and sink	25
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 34,557 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$785.00
Man-hours per mile of line	200

FARMSTEAD WIRING

Average cost per consumer	$125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $63,448,328.

Specifically for the estimate of the approximately 7 million man-hours work involved in direct labor for construction of lines, it is estimated that about 28 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 14 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification

is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

NEV. N.H N.J. N.MEX. .Y. N.CAR. N.DAK. OHIO OKLA. ORE.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 47.6% of Nevada farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 25.6% of Nevada farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Nevada, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Nevada to maintain its rightful place in our national economy.

It is the purpose of this section of the Nevada state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	3,573 a/
Total farms with electric service . . .	1,700 b/
Per cent of farms electrified	48% b/
Total rural farm dwelling units	4,777 a/
Total rural farm dwelling units with electric service	2,403 a/
Per cent rural farm dwelling units with electric service	50% a/
Total rural non-farm dwelling units . .	18,086 a/
Total rural non-farm dwelling units with electric service	13,535 a/
Per cent rural non-farm dwelling units with electric service	77% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of four additional consumers have been served by REA-financed systems since the 1940 census)	6,892 a/c/
Total miles of REA-financed lines in state of Nevada . . . . . (as of October 31, 1943)	112
Total consumers served by REA-financed systems in Nevada . . . . . (as of October 31, 1943)	421

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Western area of the U. S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	43.1
With flush toilet	26.2
With bathtub or shower	29.6

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B. and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 6,061 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line Construction	405,600	$1,713,600
Farmstead Wiring	182,150	757,700
Farm and Home Equipment		972,650
Plumbing	138,200	459,100
Totals	725,950	$3,903,050

It is estimated that approximately 827 rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately 12% of the unserved rural establishments in the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$ 1,300
Man-hours of labor per mile of line	400

FARMSTEAD WIRING

Average cost per consumer	$ 100
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 1,100
Man-hours per mile of line	300
Potentials along existing lines - Based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$ 225
Man-hours for connecting potentials	40

FARMSTEAD WIRING

Average cost per consumer	$ 125
Man-hours per farmstead	30

An expenditure of $25 and 5 man-hours of labor for each U 1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 200
10% " " " " " "	350
40% " " " " " "	40

and that:

50% of present consumers each will spend approximately	$ 70
10% " " " " " " "	250
40% " " " " " " "	25

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

38% of new and present consumers will install water system and sink at average cost of	$ 128
22% of new and present consumers will install complete bath at average cost of	$ 78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	25
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 5,566 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under boradened standards of feasibility.

Average cost per mile of line	$ 1,050
Man-hours per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 125
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly four million dollars.

Specifically for the estimate of the approximately 400 thousand man-hours work involved in direct labor for construction of lines, it is estimated that about one and one-half million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 726 thousand man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the

social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
for
RURAL ELECTRIFICATION

Suggested for inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 82.2% of New Hampshire farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 53.7% of New Hampshire farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in New Hampshire, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of New Hampshire to maintain its rightful place in our national economy.

It is the purpose of this section of the New Hampshire state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	16,554 a/
Total farms with electric service	13,600 b/
Per cent of farms electrified	82% b/
Total rural farm dwelling units	19,235 a/
Total rural farm dwelling units with electric service	11,911 a/
Per cent rural farm dwelling units with electric service	63% a/
Total rural non-farm dwelling units . . .	59,260 a/
Total rural non-farm dwelling units with electric service . . .	47,394 a/
Percent rural non-farm dwelling units with electric service . . .	82% a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 2,624 additional consumers have been served by REA-financed systems since the 1940 census)	18,799 a/c/
Total miles of REA-financed lines in state of New Hampshire . . . (as of October 31, 1943)	1,373
Total consumers served by REA-financed systems in New Hampshire . . . (as of October 31, 1943)	2,624

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the No. East area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	57.4
With flush toilet	37.9
With bathtub or shower	35.4

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 11,475 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	689,850	$2,729,500
Farmstead Wiring	344,900	1,147,500
Farm & Home Equipment		1,775,200
Plumbing	596,400	1,928,700
Totals	1,631,150	$7,580,900

It is estimated that approximately 4,700 unserved rural establishments in New Hampshire can be served only under broadened standards of feasibility. These establishments represent approximately 25% of the unserved rural establishments of the State.

NEW HAMPSHIRE

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1200
Man-hours of labor per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 80
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 80

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1200
Man-hours per mile of line	275
Potentials along existing lines - Based on assumption that 970 potentials will be connected	
Average cost of connecting potentials	$ 90
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 100
Man-hours per farmstead	30

An expenditure of $20 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 165
10% " " " " " "	225
40% " " " " " "	50

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and that:

50% of present consumers each will spend approximately	$ 208
10% " " " " " " "	260
40% " " " " " " "	50

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

20% of new and present consumers will install water system and sink at average cost of	$ 128
15% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	$ 26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 9,899 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1100
Man-hours per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 100
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $7,500,000.

Specifically for the estimate of the approximately 700,000 man-hours work involved in direct labor for construction of lines, it is estimated that about 3 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 1½ million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expaning or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 87.1% New Jersey farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 51.6% New Jersey farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in New Jersey, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of New Jersey to maintain its rightful place in our national economy.

It is the purpose of this section of the New Jersey state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

2. The percentage of electrical equipment ownership on REA-financed systems in the No. East area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	61.3
With flush toilet	47.3
With bathtub or shower	46.9

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	25,835 a/
Total farms with electric service . . .	22,500 b/
Per cent of farms electrified.	87% b/
Total rural farm dwelling units	36,026 a/
Total rural farm dwelling units with electric service . . .	28,470 a/
Per cent rural farm dwelling units with electric service	80% a/
Total rural non-farm dwelling units . .	226,514 a/
Total rural non-farm dwelling units with electric service	206,779 a/
Per cent rural non-farm dwelling units with electric service	93% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 411 additional consumers have been served by REA-financed systems since the 1940 census)	26,732 a/c/
Total miles of REA-financed lines in state of New Jersey . . . . (as of October 31, 1943)	389
Total consumers served by REA-financed systems in New Jersey . . . (as of October 31, 1943)	1,422

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 7,386 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	610,100	$2,435,840
Farmstead Wiring	221,720	1,255,850
Farm & Home Equipment		1,380,200
Plumbing	278,100	888,100
Totals	1,109,920	$5,959,990

It is estimated that approximately 6,683 rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately 25 per cent of the unserved rural establishments in the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1100.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 150.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 80.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1100.00
Man-hours per mile of line	275

Potentials along existing lines - Based on assumption that 93 potentials will be connected

Average cost of connecting potentials	$ 80.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 170.00
Man-hours per farmstead	30

An expenditure of $20.00 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$228.00
10% " " " " " "	320
40% " " " " " "	60

and that:

50% of present consumers each will spend approximately $93.00
10% " " " " " " " 175.00
40% " " " " " " " 40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of $128.00
25% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink 26
" " complete bath 140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 7240 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after substracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line $1000.00
Man-hours per mile of line 250

FARMSTEAD WIRING

Average cost per consumer $170.00
Man-hours per farmstead 30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $6,000,000.

Specifically for the estimate of the approximately seven hundred thousand man-hours work involved in direct labor for construction of lines, it is estimated that about 3 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that one million two hundred thousand man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are

substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation. . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance. . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 18.8% of New Mexico farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 3.3% of New Mexico farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in New Mexico, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of New Mexico to maintain its rightful place in our national economy.

It is the purpose of this section of the New Mexico state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

2. The percentage of electrical equipment ownership on REA financed systems in the Western area of the U.S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owing
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units;

	Percent
With running water	13.8
With flush toilet	3.0
With bathtub or shower	8.7

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	34,105 a/
Total farms with electric service . . .	6,400 b/
Percent of farms electrified	19% b/
Total rural farm dwelling units	45,949 a/
Total rural farm dwelling units with electric service	7,870 a/
Percent rural farm dwelling units with electric service	18% a/
Total rural non-farm dwelling units . .	50,166 a/
Total rural non-farm dwelling units with electric service	22,610 a/
Percent rural non-farm dwelling units with electric service	46% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 1,575 additional consumers have been served by REA financed systems since the 1940 census)	64,656 a/ c/
Total miles of REA financed lines in state of New Mexico . . . . . (as of October 31, 1943)	1,242
Total consumers served by REA financed systems in New Mexico . . . . (as of October 31, 1943)	2,589

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 33,060 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line Construction	5,007,800	$16,738,400
Farmstead Wiring	156,000	3,306,000
Farm & Home Equipment		6,127,600
Plumbing	1,244,400	2,351,000
Totals	6,408,200	$28,523,000

It is estimated that approximately 30,000 unserved rural establishments in New Mexico can be served only under broadened standards of feasibility. These establishments are located in sparsely settled sections of the state which represent approximately 64 percent of the entire area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$900.00
Man-hours of labor per mile of line	250.00

FARMSTEAD WIRING

Average cost per consumer	$ 75.00
Man-hours per farmstead	30.00

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750.00
Man-hours per mile of line	200.00

Potentials along existing lines - Based on assumption that 50% of potentials will be connected

Average cost of connecting potentials	$100.00
Man-hours for connecting potentials	50.00

FARMSTEAD WIRING

Average cost per consumer	$100.00
Man-hours per farmstead	30.00

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$220.00
10% " " " " " "	350.00
40% " " " " " "	75.00

and that:

50% of present consumers each will spend approximately $ 70.00
10% " " " " " " " 250.00
40% " " " " " " " 25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of $128.00
25% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 31,000 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$650.00
Man-hours per mile of line	200

FARMSTEAD WIRING

Average cost per consumer	$100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $29,000,000.

Specifically for the estimate of the approximately 5 million man hours work involved in direct labor for construction of lines, it is estimated that about 30 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting, and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 6 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

N.CAR. N.DAK. OHIO OKLA. ORE.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 75% of New York farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 32.7% of New York farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in New York, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of New York to maintain its rightful place in our national economy.

It is the purpose of this section of the New York state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries, wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

2. The percentage of electrical equipment ownership on REA-financed systems in the Northeast area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Per Cent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum Cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water Systems and Pump Jacks	26.2
Cream Separator	6.2
Poultry Lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	44.1
With flush toilet	32.8
With bathtub or shower	31.4

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	153,238	a/
Total farms with electric service . . .	114,900	b/
Per cent of farms electrified	75%	b/
Total rural farm dwelling units	205,406	a/
Total rural farm dwelling units with electric service	137,417	a/
Per cent rural farm dwelling units with electric service	68%	a/
Total rural non-farm dwelling units . .	547,515	a/
Total rural non-farm dwelling units with electric service	481,388	a/
Per cent rural non-farm dwelling units with electric service	90%	a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 6,400 additional consumers have been served by REA-financed systems since the 1940 census)	131,222	a/ c/
Total miles of REA-financed lines in state of New York . . . . (as of October 31, 1943)	1,390	
Total consumers served by REA-financed systems in New York . . (as of October 31, 1943)	6,400	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B. and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 105,139 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	10,244,500	$41,170,000
Farmstead Wiring	3,167,800	18,925,500
Farm and Home Equipment		21,986,000
Plumbing	4,412,100	14,052,600
Totals	17,824,400	$96,134,100

It is estimated that approximately 19,683 rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately fifteen per cent of the unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$ 1,200
Man-hours of labor per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 160
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 90

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 1,200
Man-hours per mile of line	275
Potentials along existing lines - Based on assumption that 600 potentials will be connected	
Average cost of connecting potentials	$ 90
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 180
Man-hours per farmstead	30

An expenditure of $20 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 247
10% " " " " " "	325
40% " " " " " "	60

and that:

50% of present consumers each will spend approximately	$ 93
10% " " " " " " "	175
40% " " " " " " "	40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

30% of new and present consumers will install water system and sink at average cost of	$ 128
25% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	$ 26
" " complete bath	40

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 97,814 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$ 1,100
Man-hours per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 180
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farms and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $96,000,000.

Specifically for the estimate of the approximately 41 million man-hours work involved in direct labor for construction of lines, it is estimated that about 164 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 18 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general

contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

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"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 33.8% North Carolina farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 3.2% North Carolina farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in North Carolina, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of North Carolina to maintain its rightful place in our national economy.

It is the purpose of this section of the North Carolina state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	278,276	a/
Total farms with electric service	94,100	b/
Percent of farms electrified	34%	b/
Total rural farm dwelling units	347,147	a/
Total rural farm dwelling units with electric service	79,881	a/
Percent rural farm dwelling units with electric service	23%	a/
Total rural non-farm dwelling units . .	227,681	a/
Total rural non-farm dwelling units with electric service . .	152,252	a/
Percent rural non-farm dwelling units with electric service . .	68%	a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 21808 additional consumers have been served by REA-financed systems since the 1940 census)	336,317	a/c/
Total miles of REA-financed lines in state of North Carolina . (as of October 31, 1943)	11,832	
Total consumers served by REA-financed systems in North Carolina (as of October 31, 1943)	38,823	

a/ 1940 Census

b/ REA - 1943 Report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the No.East area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	6.9
With flush toilet	4.2
With bathtub or shower	4.2

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 247,246 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	17,722,100	$71,005,800
Farmstead Wiring	7,415,540	22,243,100
Farm & Home Equipment		35,632,600
Plumbing	4,673,000	15,763,900
Totals	29,810,640	$144,645,400

It is estimated that approximately 67,263 unserved rural establishments in North Carolina can be served only under broadened standards of feasibility. These establishments represent approximately one fifth of the total unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line $1,100.
Man-hours of labor per mile of line 250

FARMSTEAD WIRING

Average cost per consumer $65.
Man-hours per farmstead 25

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer $60.
(includes farm equipment only)

PLUMBING EXPENDITURES

No expenditure considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line $1085.
Man-hours per mile of line 250
Potentials along existing lines - Based on assumption that 1/2 of potentials will be connected
Average cost of connecting potentials $80.
Man-hours for connecting potentials 35

FARMSTEAD WIRING

Average cost per consumer $90.
Man-hours per farmstead 30
An expenditure of $20. and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50%	new	consumers	each	will	spend	approximately	$165.
10%	"	"	"	"	"	"	$225.
40%	"	"	"	"	"	"	$ 50.

and that:
50% of present consumers each will spend approximately $75.
10% " " " " " " " $165.
40% " " " " " " " $40.
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

30% of new and present consumers will install water system and sink at average cost of $128.
15% of new and present consumers will install complete bath at average cost of $78.
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink 26
" " complete bath 140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 218,638 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely setteled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line $1000.
Man-hours per mile of line 250

FARMSTEAD WIRING

Average cost per consumer $90
Man-hours per farmstead 30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly 145 million dollars.

Specifically for the estimate of the approximately 18 million man-hours work involved in direct labor for construction of lines, it is estimated that about 72 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 30 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

N.DAK. | OHIO | OKLA. | ORE.

2

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 6.9% of North Dakota farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 2.3% of North Dakota farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a war-time to a peace-time economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in North Dakota, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of North Dakota to maintain its rightful place in our national economy.

It is the purpose of this section of the North Dakota state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available.

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	73,962a/
Total farms with electric service.	5,100b/
Percent of farms electrified	6.9b/
Total rural farm dwelling units.	78,700a/
Total rural farm dwelling units with electric service	11,944a/
Percent rural farm dwelling units with electric service	15.5%a/
Total rural non-farm dwelling units.	49,063a/
Total rural non-farm dwelling units with electric service . .	40,087a/
Percent rural non-farm dwelling units with electric service. .	82.8%a/
Total rural farm and non-farm dwelling units without electric service . .	73,896a/c/

(A total of 3,105 additional consumers have been served by REA financed systems since the 1940 census).

Total miles of REA financed lines in North Dakota. . . (as of October 31, 1943)	2,859
Total consumers served by REA financed systems in North Dakota . . (as of October 31, 1943)	5,755

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census.

2. The percentage of electrical equipment ownership on REA financed systems in the Western States having an average service experience of 16 months as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry Lighting	6.9
Range	6.8
Brooder	3.8

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units

	Percent
With running water	6.0
With flush toilet	2.9
With bathtub or shower	3.2

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimates of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 45,059 establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	3,465,090	$16,982,530
Farmstead Wiring	1,356,580	6,841,870
Farm and Home Equipment		8,871,690
Plumbing	2,022,080	3,370,570
Totals	6,843,750	$36,066,660

It is estimated that approximately 25,733 unserved establishments in North Dakota can be served only under broadened standards of feasibility. These establishments are located in twenty-one counties which represent approximately twenty-five per cent of the total area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,250.00
Man-hours of labor per mile of line	300

FARMSTEAD WIRING

Average cost per consumer	$ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 960.00
Man-hours per mile of line	180
Potentials along existing lines. Total number based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$ 160.00
Man-hours for connecting potentials	30

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers will spend approximately	$ 200.00
10% " " " " "	375.00
40% " " " " "	75.00

and that:

50% of present consumers will spend approximately	$ 70.00
10% " " " " " "	250.00
40% " " " " " "	25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$ 128.00
20% of new and present consumers will install complete bath at average cost of	$ 78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor

For installing pump and sink	25
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 34,557 consumers which it is esimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$ 890.00
Man-hours per mile of line	180

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $36,000,000.

Specifically for the estimate of the approximately 4 million man hours work involved in direct labor for construction of lines, it is estimated that about 16 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 7 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The application of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year, in considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

OHIO | OKLA. | ORE. | PA. | S.CAR. | S.DAK. | TENN. | TEX. | UTAH | VT.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 74.4% of Ohio farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 18.8% of Ohio farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Ohio, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Ohio to maintain its rightful place in our national economy.

It is the purpose of this section of the Ohio state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	233,783 a/
Total farms with electric service . . .	174,000 b/
Percent of farms electrified	74% b/
Total rural farm dwelling units	280,955 a/
Total rural farm dwelling units with electric service	164,469 a/
Percent rural farm dwelling units with electric service	59% a/
Total rural non-farm dwelling units . .	365,025 a/
Total rural non-farm dwelling units with electric service	313,693 a/
Percent rural non-farm dwelling units with electric service	87% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 23485 additional consumers have been served by REA financed systems since the 1940 census)	164,034 a/ c/
Total miles of REA financed lines in state of Ohio . . . (as of October 31, 1943)	18,233
Total consumers served by REA financed systems in Ohio . . (as of October 31, 1943)	59,501

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the N.Central area of the US. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	89.0
Radio	90.9
Washing Machine	79.1
Refrigerator	43.1
Toaster	44.4
Hot Plate	19.6
Vacuum cleaner (floor)	28.0
Motor up to 1 HP	28.7
Coffee Maker	7.8
Water systems and pump jacks	24.0
Cream separator	19.0
Poultry lighting	18.9
Range	5.4
Brooder	10.3
Milking Machine	5.9
Electric Fence	4.3
Motor, 1 HP & over	3.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	23.2
With flush toilet	16.9
With bathtub or shower	16.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 111,620 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	6,818,600	$31,580,200
Farmstead Wiring	4,459,900	22,324,000
Farm & Home Equipment		27,707,000
Plumbing	6,288,000	10,644,000
Totals	17,566,500	92,255,200

It is estimated that approximately 16,400 unserved rural establishments in Ohio can be served only under broadened standards of feasibility. These establishments represent approximately 15 per cent of the unserved establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

OHIO

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1050.00
Man-hours of labor per mile of line	230

FARMSTEAD WIRING

Average cost per consumer	$ 150.00
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 100.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases.

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 810.00
Man-hours per mile of line	190
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$ 130.00
Man-hours for connecting potentials	10

FARMSTEAD WIRING

Average cost per consumer	$ 200.00
Man-hours per farmstead	40

An expenditure of $50.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 250.00
10% " " " " " "	350.00
40% " " " " " "	75.00

and that:

50% of present consumers each will spend approximately	$ 80.00
10% " " " " " " "	250.00
40% " " " " " " "	40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

36% of new and present consumers will install water system and sink at average cost of	$128.00
22% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 92,190 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$790.00
Man-hours per mile of line	170

FARMSTEAD WIRING

Average cost per consumer	$200.00
Man-hours per farmstead	40

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $92,000,000.

Specifically for the estimate of the approximately 7 million man hours work involved in direct labor for construction of lines, it is estimated that about 28 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 18 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

OKLA.
ORE.
PA.
S.CAR.
S.DAK.
TENN.
TEX.
UTAH
VT.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 17.2% of Oklahoma farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935 when only 2.6% of Oklahoma farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Oklahoma, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Oklahoma to maintain its rightful place in our national economy.

It is the purpose of this section of the Oklahoma state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunitied and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	179,687 a/
Total farms with electric service	31,000 b/
Per cent of farms electrified	17% b/
Total rural farm dwelling units	232,008 a/
Total rural farm dwelling units with electric service	32,719 a/
Per cent rural farm dwelling units with electric service	14% a/
Total rural non-farm dwelling units . . .	145,864 a/
Total rural non-farm dwelling units with electric service	82,481 a/
Per cent rural non-farm dwelling units with electric service	58% a/
Total rural farm and non-farm dwelling units without electric service . . . . . (a total of 11,726 additional consumers have been served by REA-financed systems since the 1940 census)	258,215 a/c/
Total miles of REA-financed lines in state of Oklahoma . . . (as of October 31, 1943)	11,480
Total consumers served by REA-financed systems in Oklahoma (as of October 31, 1943)	24,104

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND THE END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$850
Man-hours of labor per mile of line	280

FARMSTEAD WIRING

Average cost per consumer	$ 80
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 75

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD- TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$700
Man-hours per mile of line	260
Potentials along existing lines - Based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$175
Man-hours for connecting potentials	10

FARMSTEAD WIRING

Average cost per consumer	$105
Man-hours per farmstead	32

An expenditure of $40 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$220
10% " " " " " "	350
40% " " " " " "	75

and that:

50% of present consumers each will spend approximately	$ 80
10% " " " " " " "	250
40% " " " " " " "	40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% of new and present consumers will install water system and sink at average cost of	$128
18% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 159,314 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$560
Man-hours per mile of line	200

FARMSTEAD WIRING

Average cost per consumer	$125
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $116,000,000.

Specifically for the estimate of the approximately 16 million man-hours work involved in direct labor for construction of lines, it is estimated that about 64 million man-hours of work would be required for the indirect labor, indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 29 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

ORE. PA. S.CAR. S.DAK. TENN. TEX. UTAH VT.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 75.2% of Oregon farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 27.5% of Oregon farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes posible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Oregon, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Oregon to maintain its rightful place in our national economy.

It is the purpose of this section of the Oregon state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	61,829 a/
Total farms with electric service . . .	46,500 b/
Percent of farms electrified	75% b/
Total rural farm dwelling units	80,998 a/
Total rural farm dwelling units with electric service	47,566 a/
Percent rural farm dwelling units with electric service	60% a/
Total rural non-farm dwelling units . . .	104,744 a/
Total rural non-farm dwelling units with electric service	85,787 a/
Percent rural non-farm dwelling units with electric service	83% a/
Total rural farm and non-farm dwelling units without electric service . . . . . (a total of 5,545 additional consumers have been served by REA financed systems since the 1940 census)	51,108 a/ c/
Total miles of REA financed lines in state of Oregon . . . (as of October 31, 1943)	2,383
Total consumers served by REA financed systems in Oregon . . (as of October 31, 1943)	7,054

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,250.00
Man-hours of labor per mile of line	350

FARMSTEAD WIRING

Average cost per consumer	$ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1,000.00
Man-hours per mile of line	275.00
Potentials along existing lines - Based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$ 225.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	32

An expenditure of $50.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 200.00
10% " " " " " "	300.00
40% " " " " " "	75.00

and that:

50% of present consumers each will spend approximately	$ 70.00
10% " " " " " " "	250.00
40% " " " " " " "	25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of	$ 128.00
22% of new and present consumers will install complete bath at average cost of	$ 78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 33,680 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1,000.00
Man-hours per mile of line	225

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	32

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $31,000,000.

Specifically for the estimate of the approximately 4 million man hours work involved in direct labor for construction of lines, it is estimated that about 16 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 7 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

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running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification accoring to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 65.0% Pennsylvania farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 23.6% Pennsylvania farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Pennsylvania, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the state of Pennsylvania to maintain its rightful place in our national economy.

It is the purpose of this section of the Pennsylvania state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	169,027	a/
Total farms with electric service . . .	109,800	b/
Per cent of farms electrified	65%	b/
Total rural farm dwelling units	220,241	a/
Total rural farm dwelling units with electric service	125,281	a/
Per cent rural farm dwelling units with electric service	58%	a/
Total rural non-farm dwelling units . .	633,218	a/
Total rural non-farm dwelling units with electric service	544,757	a/
Per cent rural non-farm dwelling units with electric service	87%	a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 13424 additional consumers have been served by REA-financed systems since the 1940 census)	180,629	a/ c/
Total miles of REA-financed lines in state of Pennsylvania . . . . . (as of October 31, 1943)	9,341	
Total consumers served by REA-financed systems in Pennsylvania . . . (as of October 31, 1943)	28,595	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the No. East area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry Lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment,

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	37.9
With flush toilet	23.1
With bathtub or shower . .	22.8

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 145,530 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	13,003,900	$52,035,000
Farmstead Wiring	4,372,800	26,178,000
Farm & Home Equipment		32,110,000
Plumbing	5,917,400	18,928,000
Totals	23,294,100	$129,251,000

It is estimated that approximately 21,675 rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately 12 per cent of the unserved rural establishments in the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1200.00
Man-hours of labor per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 150.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 80.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1200.00
Man-hours per mile of line	275
Potentials along existing lines - Based on assumption that 3,500 potentials will be connected	
Average cost of connecting potentials	$ 90.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 180.00
Man-hours per farmstead	30

An expenditure of $20.00 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50%	new consumers	each	will	spend	approximately	$268.00
10%	"	"	"	"	"	$400.00
40%	"	"	"	"	"	$ 65.00

and that:

50% of present consumers each will spend approximately	$93.00
10% " " " " " " "	$175.00
40% " " " " " " "	$40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

30% of new and present consumers will install water system and sink at average cost of	$128.00
20% of new and present consumers will install complete bath at average cost of	$ 78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED

The total of 135,676 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1100.00
Man-hours per mile of line	$ 275.00

FARMSTEAD WIRING

Average cost per consumer	$ 180.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rual electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly 130 million dollars.

Specifically for the estimate of the approximately 13 million man-hours work involved in direct labor for construction of lines, it is estimated that about 52 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 23-1/2 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural

electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 35.7% of South Carolina farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 2.3% of South Carolina farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in South Carolina, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of South Carolina to maintain its rightful place in our national economy.

It is the purpose of this section of the South Carolina state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost, non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	137,558	a/
Total farms with electric service . . .	49,100	b/
Per cent of farms electrified	36%	b/
Total rural farm dwelling units	199,974	a/
Total rural farm dwelling units with electric service	32,731	a/
Per cent rural farm dwelling units with electric service	17%	a/
Total rural non-farm dwelling units . .	132,422	a/
Total rural non-farm dwelling units with electric service . . .	82,327	a/
Per cent rural non-farm dwelling units with electric service . . .	63%	a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 16,242 additional consumers have been served by REA-financed systems since the 1940 census)	213,883	a/ c/
Total miles of REA-financed lines in state of South Carolina . . . (as of October 31, 1943)	10,250	
Total consumers served by REA-financed systems in South Carolina . . (as of October 31, 1943)	30,032	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern Area of the U. S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per Cent Owing
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per Cent
With running water	5.3
With flush toilet	3.9
With bathtub or shower . . .	3.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 153,883 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	8,828,000	$50,290,500
Farmstead Wiring	3,697,150	10,771,900
Farm and Home Equipment		21,802,800
Plumbing	4,130,800	6,398,000
Totals	16,655,950	$89,263,200

It is estimated that approximately 20% of the unserved rural establishments in South Carolina can be served only under broadened standards of feasibility. This is a total of about 38,470 establishments which represent the lower income homes and those establishments which are scattered throughout the state in small isolated areas.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

The expenditures for electrical and plumbing equipment cover the initial purchases which will be made during the first 18 months of service. No consideration is given to additional purchases over a long-time period. Estimates were based on REA saturation survey of 1941, with percentages increased to take care of wartime savings, group purchases, etc.

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of connections under WPB regulations to date

Average cost per mile of line	$ 635.00
Man-hours of labor per mile of line	220

FARMSTEAD WIRING

Average cost per consumer	$ 50.00
Man-hours per farmstead	22

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 50.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 850.00
Man-hours per mile of line	175
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$ 66.00
Man-hours for connecting potentials	33

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	24

An expenditure of $20.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 150.00
10% " " " " " "	350.00
40% " " " " " "	35.00

and that:

50%	of present consumers each will spend approximately	$ 60.00
10%	" " " " " " "	$200.00
40%	" " " " " " "	$ 25.00

PLUMBING EXPENDITURES

Based on the assumption that:

20% of new and present consumers will install water system and sink at average cost of $128.00
10% of new and present consumers will install complete bath at average cost of $ 78.00

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED

The total of 141,113 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total farms electrified since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1020.00
Man-hours per mile of line	175

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	24

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $89,263,200.00.

Specifically for the estimate of the approximately nine million man-hours work involved in direct labor for construction of lines, it is estimated that about 36 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 17 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural

electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 9.8% of South Dakota farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 3.5% of South Dakota farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a war-time to a peace-time economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in South Dakota, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of South Dakota to maintain its rightful place in our national economy.

It is the purpose of this section of the South Dakota state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available.

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	72,454a/
Total farms with electric service . .	7,900b/
Per cent of farms electrified.	98%b/
Total rural farm dwelling units	81,376a/
Total rural farm dwelling units with electric service .	14,184a/
Per cent rural farm dwelling units with electric service .	17.9%a/
Total rural non-farm dwelling units . .	53,087a/
Total rural non-farm dwelling units with electric service .	42,076a/
Per cent rural non-farm dwelling units with electric service	80.6%a/
Total rural farm and non-farm dwelling units without electric service (a total of 3100 consumers have been added to REA systems since the 1940 census)	75,244a/
Total miles of REA financed lines in South Dakota . . . . (as of October 31, 1943)	2,213
Total consumers served by REA financed systems in South Dakota . . . (as of October 31, 1943)	4,116

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

c

2. The percentage of electrical equipment ownership on REA financed systems in the Western States having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units

	Per cent
With running water . . .	25.6
With flush toilet . . .	16.5
With bathtub or shower .	15.5

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home. A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C Estimate of Immediate and Long-Range Rural Electrification Needs and Costs

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 60,000 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	4,272,630	$21,244,910
Farmstead Wiring	1,682,500	7,000,000
Farm and Home Equipment		10,726,120
Plumbing	2,267,628	4,056,000
Totals	8,222,758	$43,027,030

It is estimated that approximately 17,144 unserved establishments in S. Dakota can be served only under broadened standards of feasibility. These establishments are located in twenty-seven counties which represent approximately forty-five per cent of the total area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,250.00
Man-hours of labor per mile of line	300

FARMSTEAD WIRING

Average cost per consumer	$ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases.

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 960.00
Man-hours per mile of line	180
Potentials along existing lines. Total number based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$ 160.00
Man-hours for connecting potentials	30

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring.

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers will each spend approximately	$ 200.00
10% " " " " " "	350.00
40% " " " " " "	50.00

and that:

50% of present consumers each will spend approximately	70.00
10% " " " " " " "	250.00
40% " " " " " " "	25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$128.00
20% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours labor:

For installing pump and sink	25
For installing complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 47,400 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility

Average cost per mile of line	890.00
Man-hours per mile of line	180

FARMSTEAD WIRING

Average cost per consumer	$125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment, and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $43,000,000

Specifically for the estimate of the approximately 4 million man-hours work involved in direct labor for construction of lines, it is estimated that about 16 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 8 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contigent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-

being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The application of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

TENN. TEX. UTAH VT.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 24.5% Tennessee farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 3.6% Tennessee farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Tennessee, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Tennessee to maintain its rightful place in our national economy.

It is the purpose of this section of the Tennessee state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	247,617	a/
Total farms with electric service . . .	60,600	b/
Per cent of farms electrified.	25%	b/
Total rural farm dwelling units	300,344	a/
Total rural farm dwelling units with electric service	45,248	a/
Per cent rural farm dwelling units with electric service	15%	a/
Total rural non-farm dwelling units . .	158,037	a/
Total rural non-farm dwelling units with electric service	91,476	a/
Per cent rural non-farm dwelling units with electric service	59%	a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 30,080 additional consumers have been served by REA-financed systems since the 1940 census)	317,636	a/c/
Total miles of REA-financed lines in state of Tennessee . . . . . (as of October 31, 1943)	11,088	
Total consumers served by REA-financed systems in Tennessee . . . . (as of October 31, 1943)	68,857	

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern area of the U. S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	5.8
With flush toilet	3.7
With bathtub or shower . . .	3.8

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 255,796 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	15,314,000	$85,841,700
Farmstead Wiring	7,668,600	20,463,900
Farm & Home Equipment		44,396,900
Plumbing	7,188,600	24,469,000
	30,171,200	$175,171,500

It is estimated that approximately 31,760 unserved rural establishments in Tennessee can be served only under broadened standards of feasibility. These establishments represent approximately one-tenth of the total unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of the number of U-1-c connections to date

Average cost per mile of line $790.00
Man-hours of labor per mile of line 264

FARMSTEAD WIRING

Average cost per consumer $60.00
Man-hours per farmstead 23

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer $60.00
(includes farm equipment only)

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line $870.00
Man-hours per mile of line 182
Potentials along existing lines - Based on assumption that 1/2 of potentials will be connected
Average cost of connecting potentials $71.00
Man-hours for connecting potentials 35

FARMSTEAD WIRING

Average cost per consumer $80.00
Man-hours per farmstead 30
An expenditure of $20.00 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately $208.00
10% " " " " " " $260.00
40% " " " " " " $ 50.00

and that:

50% of present consumers each will spend approximately $75.00
10% " " " " " " " $165.00
40% " " " " " " " $40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% of new and present consumers will install water system and sink at average cost of $128.00
5% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink 26
" " complete bath 140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED

The total of 266,614 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line $1042.00
Man-hours per mile of line 182

FARMSTEAD WIRING

Average cost per consumer $80.00
Man-hours per farmstead 30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

50% of new and present consumers will install water system and sink at average cost of $128.00
25% of new and present consumers will install complete bath at average cost of $78.00

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly 175 million dollars.

Specifically for the estimate of the approximately 15-1/2 million man-hours work involved in direct labor for construction of lines, it is estimated that about 62 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 30 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

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of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

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"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 28.2% of Texas farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 2.3% of Texas farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Texas, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Texas to maintain its rightful place in our national economy.

It is the purpose of this section of the Texas state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	418,000	a/
Total farms with electric service . .	117,900	b/
Percent of farms electrified	28%	b/
Total rural farm dwelling units . . .	575,663	a/
Total rural farm dwelling units with electric service . . .	104,323	a/
Percent rural farm dwelling units with electric service . . .	18%	a/
Total rural non-farm dwelling units .	383,239	a/
Total rural non-farm dwelling units with electric service	238,361	a/
Percent rural non-farm dwelling units with electric service . . .	63%	a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 41370 additional consumers have been served by REA-financed systems since the 1940 census)	606,395	a/c/
Total miles of REA-financed lines in state of Texas . . . . . (as of October 31, 1943)	37,653	
Total consumers served by REA-financed systems in Texas . . . (as of October 31, 1943)	84,726	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern Area of the U.S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	19.7
With flush toilet	7.5
With bathtub or shower	11.3

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 454,110 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	36,594,000	$119,845,000
Farmstead Wiring	13,683,000	45,511,000
Farm & Home Equipment	---	116,474,000
Plumbing	19,474,000	37,405,000
Totals	69,751,000	$319,235,000

It is estimated that approximately 113580 rural establishments can be served only under broadened standards of feasibility. These establishments represent approximately twenty per cent of the unserved rural establishments in the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$900.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 75.00
Man-hours per farmstead	28

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$135.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750.00
Man-hours per mile of line	200

Potentials along existing lines - Based on assumption that 75% of potentials will be connected

Average cost of connecting potentials	$100.00
Man-hours for connecting potentials	50

FARMSTEAD WIRING

Average cost per consumer	$100.00
Man-hours per farmstead	30

An expenditure of $30.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$300.00
10% " " " " " "	$400.00
40% " " " " " "	$ 90.00

and that:

50% of present consumers each will spend approximately	$100.00
10% " " " " " " "	$220.00
40% " " " " " " "	$ 70.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of	$128.00
25% of new and present consumers will install complete bath at average cost of	$ 78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED

The total of 400,230 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$650.00
Man-hours per mile of line	200

FARMSTEAD WIRING

Average cost per consumer	$100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $319,000,000.

Specifically for the estimate of the approximately 36 million man-hours work involved in direct labor for construction of lines, it is estimated that about 144 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 70 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America. . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance. . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity. . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 76.0% of Utah farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 52.5% of Utah farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Utah, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Utah to maintain its rightful place in our national economy.

It is the purpose of this section of the Utah state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	25,411a/
Total farms with electric service . . .	19,300b/
Percent of farms electrified	76%b/
Total rural farm dwelling units	22,266a/
Total rural farm dwelling units with electric service	16,408a/
Percent rural farm dwelling units with electric service	75%a/
Total rural non-farm dwelling units . .	39,763a/
Total rural non-farm dwelling units with electric service	36,590a/
Percent rural non-farm dwelling units with electric service	93%a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 1130 additional consumers have been served by REA financed systems since the 1940 census)	8,785a/c/
Total miles of REA financed lines in state of Utah . . . . . (as of October 31, 1943)	646
Total consumers served by REA financed systems in Utah . . . . . (as of October 31, 1943)	2,165

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Western area of the U.S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	50.5
With flush toilet	30.8
With bathtub or shower	31.5

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 4863 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	517,700	$1,701,500
Farmstead Wiring	188,800	627,400
Farm & Home Equipment		1,277,100
Plumbing	327,700	589,600
Totals	1,034,200	4,195,600

It is estimated that approximately 1400 unserved rural establishments in Utah can be served only under broadened standards of feasibility. These establishments represent approximately 18% of the total unserved rural establishments and are located in the more sparsely settled areas which constitute approximately 37% of the total area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES :

UTAH

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$900.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$75.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750.00
Man-hours per mile of line	200

Potentials along existing lines - Based on assumption that 75% of potentials will be connected

Average cost of connecting potentials	$100.00
Man-hours for connecting potentials	50

FARMSTEAD WIRING

Average cost per consumer	$100.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$200.00
10% " " " " " "	100.00
40% " " " " " "	50.00

and that:

50% of present consumers each will spend approximately		$ 70.00
10% " " " " " "		250.00
40% " " " " " "		25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of $128.00
25% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 4863 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$650.00
Man-hours per mile of line	200

FARMSTEAD WIRING

Average cost per consumer	$100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That prinicple permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $4,000,000.

Specifically for the estimate of the approximately one half million man hours work involved in direct labor for construction of lines, it is estimated that about two million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some one million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity. . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

VT.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 62.3% of Vermont farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 29.4% of Vermont farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Vermont, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Vermont to maintain its rightful place in our national economy.

It is the purpose of this section of the Vermont state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	23,582 a/
Total farms with electric service . . .	14,700 b/
Percent of farms electrified	62% b/
Total rural farm dwelling units	28,580 a/
Total rural farm dwelling units with electric service	14,947 a/
Percent rural farm dwelling units with electric service	53% a/
Total rural non-farm dwelling units . .	44,036 a/
Total rural non-farm dwelling units with electric service	36,408 a/
Percent rural non-farm dwelling units with electric service	84% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 2,105 additional consumers have been served by REA-financed systems since the 1940 census)	20,949 a/ c/
Total miles of REA-financed lines in state of Vermont . . . . . (as of October 31, 1943)	983
Total consumers served by REA-financed systems in Vermont . . . . . (as of October 31, 1943)	2,548

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Northeast area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	72.9
With flush toilet	40.5
With bathtub or shower	36.2

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 15,702 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	1,421,575	$5,694,700
Farmstead Wiring	471,900	2,276,500
Farm & Home Equipment		2,626,400
Plumbing	900,700	2,994,800
Totals	2,794,175	$13,592,400

It is estimated that approximately 3,142 unserved rural establishments in Vermont can be served only under broadened standards of feasibility. These establishments represent approximately one-sixth of the total unserved rural establishments in the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,200.00
Man-hours of labor per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$80.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file.

Average cost per mile of line	$1,200.00
Man-hours per mile of line	275

Potentials along existing lines - Based on assumption that 200 potentials will be connected

Average cost of connecting potentials	$90.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$145.00
Man-hours per farmstead	30

An expenditure of $20.00 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$208.00
10% " " " " " "	260.00
40% " " " " " "	50.00

and that:

50% of present consumers each will spend approximately	$93.00
10% " " " " " " "	$175.00
40% " " " " " " "	$40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

15% of new and present consumers will install water system and sink at average cost of $128.00
15% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 14,885 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1,100.00
Man-hours per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$145.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $14,000,000.

Specifically for the estimate of the approximately $2\frac{1}{2}$ million man-hours work involved in direct labor for construction of lines, it is estimated that about 10 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 3 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

WYO. | REGION MAP | APLCH. REGION | CAL.-NEV. REGION | GREAT PLAINS | MIDWEST REGION | N.E. REGION | PAC. N.W. REGION | SOUTH CENTRAL | S.E. REGION | S.W. INTERMOUNTAIN REGION | VA. | WASH. | W.VA. | WISC.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar program to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 32.1% of Virginia farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 7.6% of Virginia farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Virginia, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Virginia to maintain its rightful place in our national economy.

It is the purpose of this section of the Virginia state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	174,885 a/
Total farms with electric service . . .	56,100 b/
Per cent of farms electrified	32% b/
Total rural farm dwelling units	222,840 a/
Total rural farm dwelling units with electric service	51,981 a/
Per cent rural farm dwelling units with electric service	24% a/
Total rural non-farm dwelling units . . .	184,768 a/
Total rural non-farm dwelling units with electric service	117,858 a/
Per cent rural non-farm dwelling units with electric service	65% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 9,932 additional consumers have been served by REA-financed systems since the 1940 census)	234,561 a/ c/
Total miles of REA-financed lines in state of Virginia . . . . (as of October 31, 1943)	8,665
Total consumers served by REA-financed systems in Virginia (as of October 31, 1943)	24,277

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Southern area of the U. S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per Cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum Cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water Systems and Pump Jacks	11.9
Cream Separator	2.5
Poultry Lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While those figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 consus shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	12.3
With flush toilet	8.7
With bathtub or shower	8.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B. and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 188,445 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	15,482,315	$61,834,620
Farmstead Wiring	5,655,120	13,247,280
Farm and Home Equipment		25,780,410
Plumbing	7,261,551	13,097,280
Totals	28,398,986	$113,959,590

It is estimated that approximately 31,912 unserved establishments in Virginia can be served only under broadened standards of feasibility.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,100.00
Man-hours of labor per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1,100.00
Man-hours per mile of line	250
Potentials along existing lines - (Based on assumption that 50% of) (potentials will be connected)	
Average cost of connecting potentials	$ 80.00
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

Present consumers each will spend approximately	$ 70.00
New consumers each will spend approximately	$ 125.00

(Source, REA Survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

Approximately 32% of new and present consumers will install water system and sink at average cost of	$ 128.00
Approximately 20% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 180,838 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1,000.00
Man-hours per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 70.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into those costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $114,000,000.

Specifically for the estimate of the approximately 15 million man-hours work involved in direct labor for construction of lines, it is estimated that about 60 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 28 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification

is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 80.1% of Washington farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 47.5% of Washington farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Washington, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Washington to maintain its rightful place in our national economy.

It is the purpose of this section of the Washington state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	81,686 a/
Total farms with electric service . . .	65,400 b/
Percent of farms electrified	80% b/
Total rural farm dwelling units	102,529 a/
Total rural farm dwelling units with electric service	71,681 a/
Percent rural farm dwelling units with electric service	71% a/
Total rural non-farm dwelling units . .	165,746 a/
Total rural non-farm dwelling units with electric service	144,120 a/
Percent rural non-farm dwelling units with electric service	88% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 7,516 additional consumers have been served by REA-financed systems since the 1940 census)	51,003
Total miles of REA-financed lines in state of Washington . . . (as of October 31, 1943)	5,547
Total consumers served by REA-financed systems in Washington . . . (as of October 31, 1943)	12,265

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Western area of the U.S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	55.6
With flush toilet	33.7
With bathtub or shower	36.8

A modern water and sewage disposal system is probably the greatest single benefit electrcity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 43,970 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	4,299,000	$18,517,700
Farmstead Wiring	1,499,300	6,630,500
Farm & Home Equipment		10,183,000
Plumbing	2,545,600	3,311,900
Totals	8,343,900	$38,633,100

It is estimated that approximately 6500 unserved rural establishments in Washington can be served only under broadened standards of feasibility. These establishments represent approximately 92% of the unserved rural establishments west of the Cascades and approximately 80% of the unserved rural establishments east of the Cascades.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1250
Man-hours of labor per mile of line	350

FARMSTEAD WIRING

Average cost per consumer	$ 125
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 100

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1000
Man-hours per mile of line	275
Potentials along existing lines - Based on assumption that 75% of potentials will be connected	
Average cost of connecting potentials	$ 225
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 150
Man-hours per farmstead	34

An expenditure of $50 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 250
10% " " " " " "	350
40% " " " " " "	75

and that:

50% of present consumers each will spend approximately	$ 80
10% " " " " " " "	250
40% " " " " " " "	40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

40% of new and present consumers will install water system and sink at average cost of	$ 128
25% of new and present consumers will install complete bath at average cost of	78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 36570 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.

2. Total consumers connected in first and second postwar periods

3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1000
Man-hours per mile of line	225

FARMSTEAD WIRING

Average cost per consumer	$ 150
Man-hours per farmstead	34

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $39,000,000.

Specifically for the estimate of the approximately 4 million man-hours work involved in direct labor for construction of lines, it is estimated that about 16 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 8 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification accoring to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

WYO. | REGION MAP | APLCH. REGION | CAL.-NEV. REGION | GREAT PLAINS | MIDWEST REGION | N.E. REGION | PAC. N.W. REGION | SOUTH CENTRAL | S.E. REGION | S.W. INTERMOUNTAIN REGION | W.VA. | WISC.

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar program to insure full employment at wage levels commensurate with American living standards there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 32.4% of West Virginia farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 3.5% of West Virginia farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in West Virginia, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of West Virginia to maintain its rightful place in our national economy.

It is the purpose of this section of the West Virginia state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole.

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	99,282	a/
Total farms with electric service.	32,200	b/
Percent of farms electrified	32%	b/
Total rural farm dwelling units.	115,913	a/
Total rural farm dwelling units with electric service.	28,186	a/
Per cent rural farm dwelling units with electric service.	25%	a/
Total rural non-farm dwelling units.	199,660	a/
Total rural non-farm dwelling units with electric service	149,941	a/
Per cent rural non-farm dwelling units with electric service	76%	a/
Total rural farm and non-farm dwelling units without electric service. . . . . (a total of 438 additional consumers have been served by REA-financed systems since the 1940 census)	135,812	a/c/
Total miles of REA-financed lines in state of West Virginia . . . . (as of October 31, 1943)	460	
Total consumers served by REA-financed systems in West Virginia. . . . (as of October 31, 1943)	1,335	

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Northeast area of the U.S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	10.6
With flush toilet	6.2
With bathtub or shower	6.2

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 85,374 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line Construction	7,342,120	$32,868,200
Farmstead Wiring	2,560,650	7,257,250
Farm & Home Equipment		10,804,400
Plumbing	892,700	3,352,400
Totals	10,795,470	$54,282,250

It is estimated that approximately 50,000 unserved rural establishments in West Virginia can be served only under broadened standards of feasibility. These establishments represent approximately one-third of the total unserved rural establishments in the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

WEST VIRGINIA

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,100.00
Man-hours of labor per mile of line	260

FARMSTEAD WIRING

Average cost per consumer	$65.00
Man-hours per farmstead	25

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$60.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Potentials along existing lines - Based on assumption that one-half of potentials will be connected.

Average cost of connecting potentials	$140.00
Man-hours for connecting potentials	20

FARMSTEAD WIRING

Average cost per consumer	$85.00
Man-hours per farmstead	27

An expenditure of $20.00 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$165.00
10% " " " " " "	225.00
40% " " " " " "	50.00

and that:

50% of present consumers each will spend approximately	$75.00
10% " " " " " " "	$165.00
40% " " " " " " "	$40.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

30% of new and present consumers will install water system and sink at average cost of $128.00
10% of new and present consumers will install complete bath at average cost of $78.00
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 84,818 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$850.00
Man-hours per mile of line	190

FARMSTEAD WIRING

Average cost per consumer	$85.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly 55½ million dollars.

Specifically for the estimate of the approximately 7½ million man-hours work involved in direct labor for construction of lines, it is estimated that about 30 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 11 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children."

The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resouces Planning Board. The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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Suggested Report
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RURAL ELECTRIFICATION

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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 57.1% of Wisconsin farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 19.6% of Wisconsin farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in Wisconsin, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Wisconsin to maintain its rightful place in our national economy.

It is the purpose of this section of the Wisconsin state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

WISCONSIN

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	186,735a/
Total farms with electric service . . .	106,700b/
Percent of farms electrified	57%b/
Total rural farm dwelling units	215,084a/
Total rural farm dwelling units with electric service	104,858a/
Percent rural farm dwelling units with electric service	51%a/
Total rural non-farm dwelling units . .	205,549a/
Total rural non-farm dwelling units with electric service	172,028a/
Percent rural non-farm dwelling units with electric service	85%a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 13378 additional consumers have been served by REA-financed systems since the 1940 census)	141,292a/c/
Total miles of REA-financed lines in state of Wisconsin . . . . . (as of October 31, 1943)	14,320
Total consumers served by REA-financed systems in Wisconsin . . . . . (as of October 31, 1943)	33,872

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the No. Central area of the U.S., having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	89.0
Radio	90.9
Washing Machine	79.1
Refrigerator	43.1
Toaster	44.4
Hot Plate	19.6
Vacuum cleaner (floor)	28.0
Motor up to 1 HP	28.7
Coffee Maker	7.8
Water systems and pump jacks	24.0
Cream separator	19.0
Poultry lighting	18.9
Range	5.4
Brooder	10.3
Milking Machine	5.9
Electric Fence	4.3
Motor, 1 HP & over	3.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	19.0
With flush toilet	11.6
With bathtub or shower	11.8

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 96,640 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	6,164,900	$28,718,000
Farmstead Wiring	4,016,800	16,950,000
Farm & Home Equipment		19,727,500
Plumbing	4,871,000	8,255,000
Totals	15,052,700	$73,650,500

It is estimated that approximately 24,160 unserved rural establishments in Wisconsin can be served only under broadened standards of feasibility. Thes establishments represent approximately 20 per cent of the unserved establishments of the State.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1192
Man-hours of labor per mile of line	267

FARMSTEAD WIRING

Average cost per consumer	$ 130
Man-hours per farmstead	54

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 85

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 825
Man-hours per mile of lines	200
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$ 150
Man-hours for connecting potentials	27

FARMSTEAD WIRING

Average cost per consumer	$ 175
Man-hours per farmstead	38

An expenditure of $50 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 200
10% " " " " " "	300
40% " " " " " "	75

and that:

50% of present consumers each will spend approximately	$ 80
10% " " " " " " "	250
40% " " " " " " "	40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of	$ 128
22% of new and present consumers will install complete bath at average cost of	$ 78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 83,210 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	800
Man-hours per mile of line	170

FARMSTEAD WIRING

Average cost per consumer	175
Man-hours per farmstead	38

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits or rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $74,000,000.

Specifically for the estimate of the approximately six million man-hours work involved in direct labor for construction of lines, it is estimated that about 24 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 15 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of

rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity. . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

WYO.

REGION MAP

APLCH. REGION

CAL.-NEV. REGION

GREAT PLAINS

MIDWEST REGION

N.E. REGION

PAC. N.W. REGION

SOUTH CENTRAL

S.E. REGION

S.W. INTERMOUNTAIN REGION

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 34% of Wyoming farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 3% of Wyoming farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Wyoming, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Wyoming to maintain its rightful place in our national economy.

It is the purpose of this section of the Wyoming state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods, so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	15,018 a/
Total farms with electric service . . .	5,100 b/
Percent of farms electrified	34% b/
Total rural farm dwelling units	22,479 a/
Total rural farm dwelling units with electric service . . .	6,818 a/
Percent rural farm dwelling units with electric service . . .	31% a/
Total rural non-farm dwelling units . .	25,365 a/
Total rural non-farm dwelling units with electric service	19,006 a/
Percent rural non-farm dwelling units with electric service	76% a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 2,230 additional consumers have been served by REA financed systems since the 1940 census)	21,511 a/ c/
Total miles of REA financed lines in state of Wyoming	2,061 d/
Total consumers served by REA financed systems in Wyoming	4,857 d/

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

d/ October 31, 1943

2. The percentage of electrical equipment ownership on REA financed systems in the Western States having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up with the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	16.1
With flush toilet	10.0
With bathtub or shower	10.4

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 12,747 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	1,273,623	$4,714,120
Farmstead Wiring	412,464	1,593,375
Farm & Home Equipment		3,106,347
Plumbing	626,208	989,310
Totals	2,312,295	10,403,152

It is estimated that approximately 6,500 unserved establishments in Wyoming can be served only under broadened standards of feasibility. These establishments are located in seven counties which represent approximately one-fourth of the total area of the state.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION - (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,000.00
Man-hours of labor per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION - (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 930.00
Man-hours per mile of line	250

Potentials along existing lines - Based on assumption that 50% of potentials will be connected

Average cost of connecting potentials	$ 200.00
Man-hours for connecting potentials	15

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$225.00
10% " " " " " "	350.00
40% " " " " " "	75.00

and that:

50% of present consumers will spend approximately	$ 70.00
10% " " " " " "	250.00
40% " " " " " "	25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$128.00
20% of new and present consumers will install complete bath at average cost of	$ 78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED

The total of 6,518 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living in sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$845.00
Man-hours per mile of line	250.00

FARMSTEAD WIRING

Average cost per consumer	$125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $10,000,000.

Specifically for the estimate of the approximately one million man hours work involved in direct labor for construction of lines, it is estimated that about four million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some two million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The application of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

REGION MAP

APLCH. REGION

CAL.-NEV. REGION

GREAT PLAINS

MIDWEST REGION

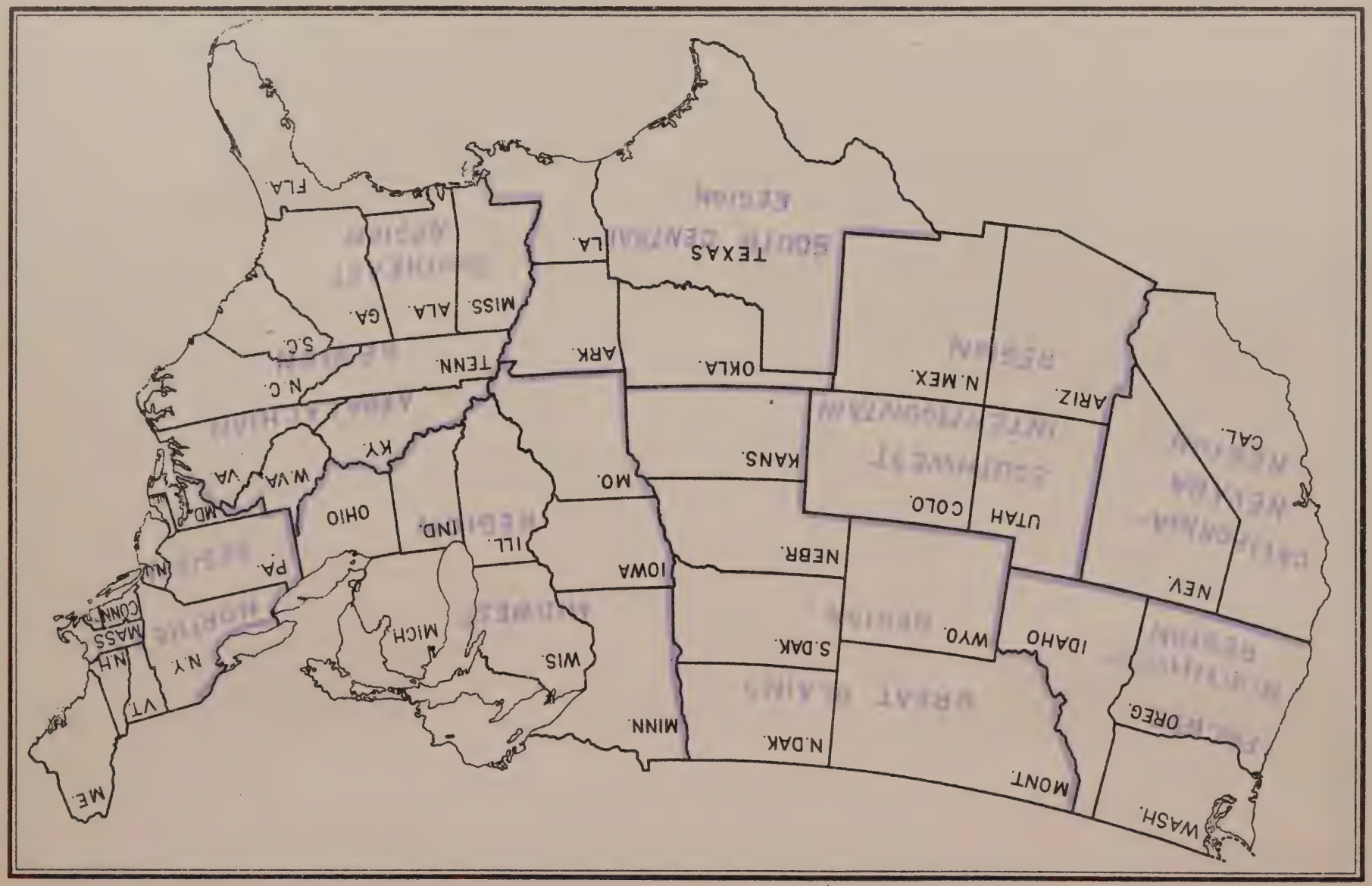
N.E. REGION

PAC. N.W. REGION

SOUTH CENTRAL

S.E. REGION

S.W. INTERMOUNTAIN REGION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ME.

APLCH. REGION | CAL.-NEV. REGION | GREAT PLAINS | MIDWEST REGION | N.E. REGION | PAC. N.W. REGION | SOUTH CENTRAL | S.E. REGION | S.W. INTERMOUNTAIN REGION

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in Regional Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present about 28.6% of the Appalachian Region farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935 when only 4.0% of the Appalachian Region farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education better recreation, and the development of new rural industries.

Specifically in the Appalachian Region, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the region. It will help the Appalachian Region to maintain its rightful place in our national economy.

It is the purpose of this section of the Appalachian region report to describe the present status of rural electrification in the region and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the region as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the region.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	1,052,954	a/
Total farms with electric service . . .	300,900	b/
Per cent of farms electrified	28.6	b/
Total rural farm dwelling units	1,280,018	a/
Total rural farm dwelling units with electric service	248,645	a/
Per cent rural farm dwelling units with electric service	19.4	a/
Total rural non-farm dwelling units . .	957,621	a/
Total rural non-farm dwelling units with electric service	623,010	a/
Per cent rural non-farm dwelling units with electric service	65.1	a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 84,485 additional consumers have been served by REA-financed systems since the 1940 census)	1,346,361	a/ c/
Total miles of REA-financed lines in Appalachian Region (as of October 31, 1943)	44,859	
Total consumers served by REA-financed systems in Appalachian Region (as of October 31, 1943)	176,368	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the S. Eastern area of the U.S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum Cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7
Electric Fence	1.4
Roaster	1.2
Milking Machine	0.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the Region averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	7.3
With flush toilet	4.8
With bathtub or shower	4.8

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 1,044,343 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	72,259,000	$342,147,000
Farmstead Wiring	31,319,000	84,619,000
Farm & Home Equipment		161,477,000
Plumbing	27,052,000	81,439,000
Totals	130,630,000	$669,682,000

It is estimated that approximately 213,138 unserved rural establishments in the Appalachian Region can be served only under broadened standards of feasibility.

and that:

50% of present consumers each will spend approximately	$ 75
10% " " " " " " "	165
40% " " " " " " "	40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% to 32% new and present consumers will install water system and sink at average cost of	$1128
5% to 20% of new and present consumers will install complete bath at average cost of	$ 78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD -LONG TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 964,734 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after substracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$850 to 1042
Man-hours per mile of line	182 to 250

FARMSTEAD WIRING

Average cost per consumer	$ 70 to 90
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice or equal the number of U-1-c connections to date

Average cost per mile of line	$790 to $1100
Man-hours of labor per mile of line	250 to 264

FARMSTEAD WIRING

Average cost per consumer	$ 60 to $ 70
Man-hours per farmstead	23 to 30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 60 to $ 72

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$870 to $1100
Man-hours per mile of line	182 to 250
Potentials along existing lines - Based on assumption that 50% of potentials will be connected	
Average cost of connecting potentials	$ 71 to $ 140
Man-hours for connecting potentials	20 to 35

FARMSTEAD WIRING

Average cost per consumer	$ 70 to $ 90
Man-hours per farmstead	27 to 30

An expenditure of $20 to $25 and 4 to 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on assumption that:

50% new consumers each will spend approximately	$165 to $ 208
10% " " " " " "	225 to 260
40% " " " " " "	50

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $670,000,000.

Specifically for the estimate of the approximately 72 million man-hours work involved in direct labor for construction of lines, it is estimated that about 288 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 131 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordian principle' in public works activity should be reserved for programs in which the direct government contribution is high."

CAL.-NEV. REGION | GREAT PLAINS | MIDWEST REGION | N.E. REGION | PAC. N.W. REGION | SOUTH CENTRAL | S.E. REGION | S.W. INTERMOUNTAIN REGION

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in Regional Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 85.7% of California - Nevada farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 53.3% California - Nevada farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commerical markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in California - Nevada Region, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the Region. It will help the California - Nevada Region to maintain its rightful place in our national economy.

It is the purpose of this section of the California - Nevada Region report to describe the present status of rural electrification in the Region and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the Region.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	136,231	a/
Total farms with electric service . .	116,700	b/
Per cent of farms electrified	85.7	b/
Total rural farm dwelling units . . .	197,391	a/
Total rural farm dwelling units with electric service . . .	156,194	a/
Per cent rural farm dwelling units with electric service . . .	79.1	a/
Total rural non-farm dwelling units .	486,146	a/
Total rural non-farm dwelling units with electric service . . .	428,737	a/
Per cent rural non-farm dwelling units with electric service . . .	88.2	a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 957 additional consumers have been served by REA-financed systems since the 1940 census)	95,250	a/c/
Total miles of REA-financed lines in California - Nevada Region (as of October 31, 1943)	1,577	
Total consumers served by REA-financed systems in California - Nevada (as of October 31, 1943)	4,629	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA — financed systems in the Western area of the United States having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (flooer)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream Separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the Region averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	76.6
With flush toilet	54.5
With bathtub or shower	59.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 87,680 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	7,716,000	$36,732,000
Farmstead Wiring	2,631,000	10,960,000
Farm & Home Equipment	----	13,598,000
Plumbing	1,279,000	4,811,000
Totals	11,627,000	$66,101,000

It is estimated that approximately 8,827 unserved rural establishments can be served only under broadened standards of feasibility.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line $1300 to $1350
Man-hours of labor per mile of line 400

FARMSTEAD WIRING

Average cost per consumer $100
Man-hours per farmstead 30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer $72
(includes farm equipment only)

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line $1100 to $1200
Man-hours per mile of line 300
Potentials along existing lines - Based on assumption that 50% 75% of potentials will be connected
Average cost of connecting potentials $225 to $250
Man-hours for connecting potentials 40

FARMSTEAD WIRING

Average cost per consumer $125
Man-hours per farmstead 30
An expenditure of $25. and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring.

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50%	new consumers	each	will	spend	approximately	$200
10%	"	"	"	"	"	350
40%		"	"	"		[illegible]

and that:
50% of present consumers each will spend approximately $70
10% " " " " " " " $250
40% " " " " " " " $25
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

38% of new and present consumers will install water system and sink at average cost of $128
22% of new and present consumers will install complete bath at average cost of $78
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink 25
" " complete bath 140

III. THIRD PERIOD-- LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 85,924 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line $1050 to $1200
Man-hours per mile of line 250

FARMSTEAD WIRING

Average cost per consumer $125
Man-hours per farmstead 30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly 66 million dollars.

Specifically for the estimate of the approximately 8 million man-hours work involved in direct labor for construction of lines, it is estimated that about 32 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 12 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commerical market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

GREAT PLAINS | MIDWEST REGION | N.E. REGION | PAC. N.W. REGION | SOUTH CENTRAL | S.E. REGION | S.W. INTERMOUNTAIN REGION

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in State Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 20.3% of the farms in the Great Plains region have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 5.6% of the Great Plains farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, the Great Plains region, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the region. It will help the Great Plains region to maintain its rightful place in our national economy.

It is the purpose of this section of the Great Plains region report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the states.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	480,556a/
Total farms with electric service . . .	98,800b/
Percent of farms electrified	21%b/
Total rural farm dwelling units	550,739a/
Total rural farm dwelling units with electric service. . . .	133,576a/
Percent rural farm dwelling units with electric service. . . .	24%a/
Total rural non-farm dwelling units . .	414,266a/
Total rural non-farm dwelling units with electric service	341,580a/
Percent rural non-farm dwelling units with electric service	82%a/
Total rural farm and non-farm dwelling units without electric service . . (a total of 28,771 consumers have been served by REA financed systems since the 1940 census)	478,743a/c/
Total miles of REA financed lines in region (as of October 31, 1943)	30,051
Total consumers on REA systems in region (as of October 31, 1943)	58,137

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Western States, having an average service experience of 16 months as reported in a survey made in 1941 is as follows:

Equipment	Percent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum Cleaner (floor)	18.4
Motor up to '1 HP	14.4
Coffee Maker	14.4
Water system and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units in Region

	Percent
With running water.	15.2
With flush toilet	8.6
With bath tub or shower	9.6

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 367,205 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	29,883,093	$127,899,890
Farmstead Wiring	11,070,484	47,110,620
Farm & Home Equipment		68,588,434
Plumbing	15,938,501	25,887,691
	56,892,078	$269,486,625

It is estimated that approximately 84,301 unserved establishments in the Great Plains region can be served only under broadened standards of feasibility. These establishments are located in one hundred and twelve counties which represent approximately thirty per cent of the total area of the region.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1,000.00
Man-hours of labor per mile of line	275

FARMSTEAD WIRING

Average cost per consumer	$ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD, TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$ 930.00
Man-hours per mile of line	250
Potentials along existing lines - (Based on assumption that 50% of) (potentials will be connected)	
Average cost of connecting potentials	$ 200.00
Man-hours for connecting potentials	15

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers will spend approximately	$ 225.00
10% " " " " "	350.00
40% " " " " "	75.00

and that:

50% of present consumers will spend approximately	$ 70.00
10% " " " " " "	250.00
40% " " " " " "	25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

32% of new and present consumers will install water system and sink at average cost of	$ 128.00
20% of new and present consumers will install complete bath at average cost of	78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
For installing complete bath	140

III. THIRD PERIOD, LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 306,915 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar period.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$ 845.00
man-hours per mile of line	250

FARMSTEAD WIRING

Average cost per consumer	$ 125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $270,000,000.

Specifically for the estimate of the approximately 29 million man hours work involved in direct labor for construction of lines, it is estimated that about 116 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 57 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

MIDWEST REGION

N.E. REGION

PAC. N.W. REGION

SOUTH CENTRAL

S.E. REGION

S.W. INTERMOUNTAIN REGION

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in Regional Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 54.7% Midwest Region farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 13.7% Midwest Region farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in the Midwest Region, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the region. It will help the Midwest Region to maintain its rightful place in our national economy.

It is the purpose of this section of the Midwest Region report to describe the present status of rural electrification in the region and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the Midwest Region as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	1,672,864	a/
Total farms with electric service	915,000	b/
Per cent of farms electrified	54.7%	b/
Total rural farm dwelling units	1,983,351	a/
Total rural farm dwelling units with electric service	841,720	a/
Per cent rural farm dwelling units with electric service	46.7%	a/
Total rural non-farm dwelling units	1,969,876	a/
Total rural non-farm dwelling units with electric service . . .	1,686,310	a/
Per cent rural non-farm dwelling units with electric service . . .	85.6%	a/
Total rural farm and non-farm dwelling units without electric service . . . . . (a total of 169,559 additional consumers have been served by REA-financed systems since the 1940 census)	1,429,708	a/c/
Total miles of REA-financed lines in Midwest Region . . . (as of October 31, 1943)	151,932	
Total consumers served by REA-financed systems in Midwest Region . . . (as of October 31, 1943)	398,489	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the N. Central area of the U. S. having an average service experience of 20 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	89.0
Radio	90.9
Washing Machine	79.1
Refrigerator	43.1
Toaster	44.4
Hot Plate	19.6
Vacuum cleaner (floor)	28.0
Motor up to 1 HP	28.7
Coffee Maker	7.8
Water systems and pump jacks	24.0
Cream separator	19.0
Poultry lighting	18.9
Range	5.4
Brooder	10.3
Milking Machine	5.9
Electric Fence	4.3
Motor, 1 HP & over	3.5

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water . . .	17.8
With flush toilet . . .	12.1
With bathtub or shower .	12.2

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 1,052,980 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	76,406,000	$323,665,000
Farmstead Wiring	39,497,000	185,930,000
Farm & Home Equipment		249,660,000
Plumbing	52,945,000	86,396,000
Totals	168,848,000	$845,650,000

It is estimated that approximately 194,450 unserved rural establishments in the Midwest Region can be served only under broadened standards of feasibility.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$950 to $1250
Man-hours of labor per mile of line	230 to 300

FARMSTEAD WIRING

Average cost per consumer	$100 to $150
Man-hours per farmstead	30 to 34

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 85 to $100

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750 to $962
Man-hours per mile of line	180 to 280

Potentials along existing lines - Based on assumption that 50-75% of potentials will be connected

Average cost of connecting potentials	$125 to $200
Man-hours for connecting potentials	30 to 40

FARMSTEAD WIRING

Average cost per consumer	$125 to $200
Man-hours per farmstead	30 to 40

An expenditure of $50 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$200 to $250
10% " " " " " "	$300 to $350
40% " " " " " "	$75

and that:
50% of present consumers each will spend approximately $80
10% " " " " " " " $ 250
40% " " " " " " " $40 to $50
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:
25% -38% of new and present consumers will install water system and sink at average cost of $128
18% - 22% of new and present consumers will install complete bath at average cost of $78
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD-LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 846,888 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility

Average cost per mile of line	$700 to $932
Man-hours per mile of line	160 to 260

FARMSTEAD WIRING

Average cost per consumer	$125 to $200
Man-hours per farmstead	30 to 40

FARM AND EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $846,000,000.

Specifically for the estimate of the approximately 76 million man-hours work involved in direct labor for construction of lines, it is estimated that about 304 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 169 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . .availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . .Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

N.E. REGION | PAC. N.W. REGION | SOUTH CENTRAL | S.E. REGION | S.W. INTERMOUNTAIN REGION

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in Regional Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 70.6% of the Northeast Region farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935 when only 30.2% of the Northeast Region farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in the Northeast Region, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the region. It will help the Northeast Region to maintain its rightful place in our national economy.

It is the purpose of this section of the Northeast Region report to describe the present status of rural electrification in the region and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the region as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the region.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	534,459 a/
Total farms with electric service	377,100 b/
Per cent of farms electrified.	70.6% b/
Total rural farm dwelling units	682,385 a/
Total rural farm dwelling units with electric service	414,893 a/
Per cent rural farm dwelling units with electric service	60.8% a/
Total rural non-farm dwelling units . .	2,102,421 a/
Total rural non-farm dwelling units with electric service . . .	1,820,476 a/
Per cent rural non-farm dwelling units with electric service . . .	86.6% a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 23,539 additional consumers have been served by REA-financed systems since the 1940 census)	539,351 a/c/
Total miles of REA-financed lines in the Northeast Region (as of October 31, 1943)	16,492
Total consumers served by REA-financed systems in the Northeast Region (as of October 31, 1943)	50,056

a/ 1940 Census
b/ REA - 1943 report
c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the No. Eastern area of the U.S. having an average service experience of 20 months as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	90.4
Radio	92.6
Washing Machine	76.3
Refrigerator	30.6
Toaster	49.9
Hot Plate	17.1
Vacuum cleaner (floor)	39.2
Motor up to 1 HP	18.3
Coffee Maker	12.5
Water systems and pump jacks	26.2
Cream separator	6.2
Poultry lighting	14.3
Range	5.4
Brooder	7.3
Electric Fence	6.1
Roaster	3.2
Milking Machine	3.1

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the Region averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	44.3
With flush toilet	30.7
With bathtub or shower	29.6

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 384,187 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	34,708,000	$138,002,000
Farmstead Wiring	11,551,000	63,981,000
Farm & Home Equipment		76,438,000
Plumbing	15,078,000	48,296,000
Totals	61,337,000	$326,717,000

It is estimated that approximately 75,631 unserved rural establishments can be served only under broadened standards of feasibility.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of the number of U-1-c connections to date

Average cost per mile of line	$1100 to $1200
Man-hours of labor per mile of line	250 to 275

FARMSTEAD WIRING

Average cost per consumer	$ 80 to $ 160
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 80 to $ 90

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD -TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1100 to $1200
Man-hours per mile of line	250 to 275
Potentials along existing lines - Based on assumption 93 to 3,500 potentials will be connected	
Average cost of connecting potentials	$ 80 to $ 90
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$ 100 to $ 200
Man-hours per farmstead	30

An expenditure of $20 and 4 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 165 to $ 268
10% " " " " " "	225 to 400
40% " " " " " "	50 to 65
and that:	
50% of present " " " " "	93 to 208
10% " " " " " " "	175 to 260
40% " " " " " " "	40 to 50

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

15% to 35% of new and present consumers will install water system and sink at average cost of	$ 128
15% to 25% of new and present consumers will install complete bath at average cost of	$ 78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD—LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED

The total of 360,674 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1000 to $1100
Man-hours per mile of line	250 to 275

FARMSTEAD WIRING

Average cost per consumer	$ 100 to $ 180
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $327,000,000.

Specifically for the estimate of the approximately 35 million man-hours work involved in direct labor for construction of lines, it is estimated that about 140 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 61 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of

rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

PAC. N.W. REGION

SOUTH CENTRAL

S.E. REGION

S.W. INTERMOUNTAIN REGION

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in Regional Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 77.1% Pacific Northwest farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 36.7% Pacific Northwest farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living, It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in the Pacific Northwest Region, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the region. It will help the Pacific Northwest Region to maintain its rightful place in our national economy.

It is the purpose of this section of the Pacific Northwest Region report to describe the present status of rural electrification in the region and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the region as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the region.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	187,178	a/
Total farms with electric service	144,300	b/
Per cent of farms electrified	77.1%	b/
Total rural farm dwelling units	237,453	a/
Total rural farm dwelling units with electric service . .	150,734	a/
Per cent rural farm dwelling units with electric service . .	63.5%	a/
Total rural non-farm dwelling units . .	316,424	a/
Total rural non-farm dwelling units . . with electric service .	266,554	a/
Per cent rural non-farm dwelling units with electric service .	84.2%	a/
Total rural farm and non-farm dwelling units without electric service . . . (a total of 15,935 additional consumers have been served by REA-financed systems since the 1940 census)	132,942	a/c/
Total miles of REA-financed lines in Pacific Northwest Region . . . . . (as of October 31, 1943)	10,913	
Total consumers served by REA-financed systems in Pacific Northwest Region . . (as of October 31, 1943)	25,865	

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Western area of the U. S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the region averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	48.4
With flush toilet	28.5
With bathtub or shower . .	31.6

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 106,621 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	10,299,800	$43,516,300
Farmstead Wiring	3,462,200	14,466,100
Farm & Home Equipment		21,919,000
Plumbing	5,391,000	8,139,100
Totals	19,153,000	$88,041,000

It is estimated that approximately 18,272 unserved establishments in the Pacific Northwest Region can be served only under broadened standards of feasibility.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$1250
Man-hours of labor per mile of line	350 to 400

FARMSTEAD WIRING

Average cost per consumer	$100 to $125
Man-hours per farmstead	30 to 34

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$72 to $100

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$1000
Man-hours per mile of line	275 to 300

Potentials along existing lines - Based on assumption that 75% of potentials will be connected

Average cost of connecting potentials	$225
Man-hours for connecting potentials	35

FARMSTEAD WIRING

Average cost per consumer	$125 to $150
Man-hours per farmstead	30 to 34

An expenditure of $25 to $50 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$200 to $250
10% " " " " " "	$300 to $350
40% " " " " " "	$40 to $75

and that:

50% of present consumers each will spend approximately	$70 to $80
10% " " " " " "	$250
40% " " " " " "	$25 to $40

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% to 40% of new and present consumers will install water system and sink at average cost of $128
22% to 25% of new and present consumers will install complete bath at average cost of $78
(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 88,125 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$1000
Man-hours per mile of line	225 to 250

FARMSTEAD WIRING

Average cost per consumer	$125 to $150
Man-hours per farmstead	30 to 34

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $88,000,000.

Specifically for the estimate of the approximately 10 million man-hours work involved in direct labor for construction of lines, it is estimated that about 40 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 19 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high.

SOUTH CENTRAL

S.E. REGION

S.W. INTERMOUNTAIN REGION

Suggested Report
for
RURAL ELECTRIFICATION

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Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of the necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete it will no doubt increase rapidly immediately after the war. At present, about 21.7% of the South Central Region farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 2.01% of the South Central Region farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in the South Cemtral Region, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the region. It will help the South Central Region to maintain its rightful place in our national economy.

It is the purpose of this section of the South Central Region report to describe the present status of rural electrification in the region and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the region as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the region.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	964,370 a/
Total farms with electric service . . .	209,000 b/
Per cent of farms electrified	21.7 b/
Total rural farm dwelling units	1,289,085 a/
Total rural farm dwelling units with electric service	178,446 a/
Per cent rural farm dwelling units with electric service	41.4 a/
Total rural non-farm dwelling units . .	788,720 a/
Total rural non-farm dwelling units with electric service	439,387 a/
Per cent rural non-farm dwelling units with electric service	55.7 a/
Total rural farm and non-farm dwelling units without electric service . . . . (a total of 75,628 additional consumers have been served by REA-financed systems since the 1940 census)	1,437,530 a/ c/
Total miles of REA-financed lines in South Central Region as of October 31, 1943	63,785
Total consumers served by REA-financed systems in South Central Region (as of October 31, 1943)	149,519

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the South Central Region of the U. S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per Cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the Region averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting, etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per Cent
With running water	11.8
With flush toilet	5.2
With bathtub or shower	7.1

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B. and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 984,262 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	77,075,400	$235,724,400
Farmstead Wiring	29,106,500	96,057,600
Farm and Home Equipment		210,013,000
Plumbing	38,631,100	66,208,000
Totals	114,813,000	$608,003,000

It is estimated that approximately 380,220 unserved rural establishments in the South Central Region can be served only under broadened standards of feasibility.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$700 to $900
Man-hours of labor per mile of line	240 to 280

FARMSTEAD WIRING

Average cost per consumer	$ 45 to $80
Man-hours per farmstead	20 to 30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$50 to $135

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$600 to $750
Man-hours per mile of line	200 to 260
Potentials along existing lines - Based on assumption that 50% to 75% of potentials will be connected	
Average cost of connecting potentials	$100 to $175
Man-hours for connecting potentials	10 to 50

FARMSTEAD WIRING

Average cost per consumer	$60 to $105
Man-hours per farmstead	24 to 32

An expenditure of $30 to $40 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$200 to $300
10% " " " " " "	$300 to $400
40% " " " " " "	$50 to $90

and that:

50% of present consumers each will spend approximately	$ 70 to $100
10% " " " " " " "	$220 to $250
40% " " " " " " "	$ 40 to $ 70

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

25% - 35% of new and present consumers will install water system and sink at average cost of	$128
18% - 25% of new and present consumers will install complete bath at average cost of	$ 78

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 836,688 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within densely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$560 to $650
Man-hours per mile of line	200 to 210

FARMSTEAD WIRING

Average cost per consumer	$ 70 to $125
Man-hours per farmstead	25 to 34

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $608,000,000.

Specifically for the estimate of the approximately 77 million man-hours work involved in direct labor for construction of lines, it is estimated that about 308 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 115 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequent no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

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"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

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in Regional Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 25.2% Southeast Region farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 2.8% Southeast Region farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in the Southeast Region, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the region. It will help the Southeast Region to maintain its rightful place in our national economy.

It is the purpose of this section of the Southeast Region report to describe the present status of rural electrification in the region and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the region as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the region.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	938,677	a/
Total farms with electric service	236,900	b/
Per cent of farms electrified	25.2%	b/
Total rural farm dwelling units	1,245,824	a/
Total rural farm dwelling units with electric service	167,422	a/
Per cent rural farm dwelling units with electric service	1.48%	a/
Total rural non-farm dwelling units	749,667	a/
Total rural non-farm dwelling units with electric service	405,667	a/
Per cent rural non-farm dwelling units with electric service	54.1%	a/
Total rural farm and non-farm dwelling units without electric service (a total of 82,246 additional consumers have been served by REA-financed systems since the 1940 census)	1,396,556	a/c/

Total miles of REA-financed lines in Southeast Region 57,770
(as of October 31, 1943)

Total consumers served by REA-financed systems in Southeast Region 181,243
(as of October 31, 1943)

a/ 1940 Census

b/ Rea - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Southern area of the U. S. having an average service experience of 19 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	79.7
Radio	87.7
Washing Machine	30.2
Refrigerator	44.9
Toaster	16.0
Hot Plate	10.9
Vacuum cleaner (floor)	8.4
Motor up to 1 HP	4.4
Coffee Maker	7.1
Water systems and pump jacks	11.9
Cream separator	2.5
Poultry lighting	4.1
Range	3.0
Brooder	4.7

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the Region averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water ..	5.1
With flush toilet . .	3.6
With bathtub or shower	3.7

a modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 1,001,770 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	58,789,620	$323,228,680
Farmstead Wiring	24,073,280	70,124,110
Farm & Home Equipment		140,195,510
Plumbing	26,661,360	42,780,410
Totals	109,524,260	$576,328,710

It is estimated that approximately 23 per cent of the unserved rural establishments in the Southeast Region can be served only under broadened standards of feasibility. This is a total of 301,970 establishments which represent the lower income homes and those establishments which are scattered throughout the Region in small isolated areas. The attached map shows the deleted areas in the state of Florida only, since these areas in the remaining four states are so small and scattered that identification would be impracticable.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

(The expenditures for electrical and plumbing equipment cover the initial purchases which will be made during the first 18 months of service. No consideration is given to additional purchases over a long-time period. Estimates were based on REA saturation survey of 1941, with percentages increased enough to take care of wartime savings, group purchases, etc.)

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of connections under WPB regulations to date.

Average cost per mile of line	$635 to $770
Man-hours of labor per mile of line	220 to 257

FARMSTEAD WIRING

Average cost per consumer	$50
Man-hours per farmstead	22

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$50

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750 to $850
Man-hours per mile of line	175 to 182

Potentials along existing lines - Based on assumption that 50% of potentials will be connected

Average cost of connecting potentials	$65 to $71
Man-hours for connecting potentials	34

FARMSTEAD WIRING

Average cost per consumer	$70
Man-hours per farmstead	24

An expenditure of $20 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$150
10% " " " " " "	$350
40% " " " " " "	$35

and that:

50% of present consumers each will spend approximately	$60
10% " " " " " "	$200
40% " " " " " "	$ 25

PLUMBING EXPENDITURES

Based on the assumption that:

22% of new and present consumers will install water system and sink at average cost of	$128
12% of new and present consumers will install complete bath at average cost of	$78

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED:

The total of 933,498 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total farms electrified since 1940 census.
2. Total consumers connected in first and second postwar period.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$900 to $1042
Man-hours per mile of line	175 to 182

FARMSTEAD WIRING

Average cost per consumer	$70
Man-hours per farmstead	24

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly $576,328,710.

Specifically for the estimate of the approximately 59 million man-hours work involved in direct labor for construction of lines, it is estimated that about 236 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 59 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . .The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . .Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

Suggested Report
for
RURAL ELECTRIFICATION

Suggested for Inclusion
in Regional Report on Postwar Planning

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 per cent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the national postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present about 43.4% of the Southwest Intermountain Region farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 19.5% of the Southwest Intermountain Region farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically in the Southwest Intermountain Region, postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the Region. It will help the Southwest Intermountain Region to maintain its rightful place in our national economy.

B-592
Southwest Intermountain Region

It is the purpose of this section of the Southwest Intermountain Region report to describe the present status of rural electrification in the Region and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the Region as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;

2. Optimum application of electricity to farm production and farm family living;

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;

4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the Region.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	129,420	a/
Total farms with electric service . . .	56,200	b/
Per cent of farms electrified	43.4%	b/
Total rural farm dwelling units	176,036	a/
Total rural farm dwelling units with electric service	59,397	a/
Per cent rural farm dwelling units with electric service	27.9%	a/
Total rural non-farm dwelling units . .	248,175	a/
Total rural non-farm dwelling units with electric service	173,361	a/
Per cent rural non-farm dwelling units with electric service	69.8%	a/
Total rural farm and non-farm dwelling units without electric service . . . . . (a total of 13,469 additional consumers have been served by REA-financed systems since the 1940 census)	187,792	a/c/
Total miles of REA-financed lines in the Southwest Intermountain Region (as of October 31, 1943)	8,459	
Total consumers served by REA-financed systems in the Southwest Intermountain Region (as of October 31, 1943)	21,103	

a/ 1940 Census

b/ REA - 1943 Report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA-financed systems in the Western area of the U. S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

Equipment	Per cent Owning
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the Region averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long-term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Per cent
With running water	24.0
With flush toilet	14.1
With bathtub or shower	15.1

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 119,103 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	Man-hours	Cost
Line construction	17,212,200	$54,930,000
Farmstead Wiring	2,622,900	12,834,700
Farm & Home Equipment	-	22,744,700
Plumbing	4,279,000	8,951,000
Totals	24,114,100	$99,460,400

It is estimated that approximately 55,400 unserved rural establishments in the Southwest Intermountain Region can be served only under broadened standards of feasibility. These establishments represent about 32 per cent of the total unserved rural establishments and are located in the more sparsely settled areas of the Region which constitute approximately 45% of the total area of the Region.

THE ESTIMATES GIVEN IN THE ATTACHED REPORT WERE BASED ON THE FOLLOWING FIGURES

I. FIRST PERIOD - BETWEEN NOW AND END OF WAR

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Estimated on the basis of twice the number of U-1-c connections to date

Average cost per mile of line	$900.00 to $1000.00
Man-hours of labor per mile of line	250 to 275

FARMSTEAD WIRING

Average cost per consumer	$ 75.00 to $ 100.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Expenditure per consumer (includes farm equipment only)	$ 72.00

PLUMBING EXPENDITURES

No expenditures considered in this period - water systems were included in farm equipment purchases

II. SECOND PERIOD - TRANSITION

LINE CONSTRUCTION (includes organization work, contingencies, engineering and legal)

Miles and Consumers - Based on total allotments under stop order and applications on file

Average cost per mile of line	$750.00 to $ 930.00
Man-hours per mile of line	200 to 250

Potentials along existing lines - Based on assumption that 70% of potentials will be connected

Average cost of connecting potentials	$100.00 to $ 200.00
Man-hours for connecting potentials	15 to 50

FARMSTEAD WIRING

Average cost per consumer	$100.00 to $ 125.00
Man-hours per farmstead	30

An expenditure of $25.00 and 5 man-hours of labor for each U-1-c connection are included to take care of additional wiring

FARM AND HOME EQUIPMENT EXPENDITURES

Based on the assumption that:

50% new consumers each will spend approximately	$ 200.00
10% " " " " " "	$ 425.00
40% " " " " " "	$ 70.00

and that:

50% of present consumers each will spend approximately	$ 70.00
10% " " " " " " "	$250.00
40% " " " " " " "	$ 25.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

PLUMBING EXPENDITURES

Based on the assumption that:

35% of new and present consumers will install water system and sink at average cost of	$128.00
25% of new and present consumers will install complete bath at average cost of	$ 78.00

(Source, REA survey of 1941, with saturation percentages increased enough to take care of wartime savings, group purchases, etc.)

Man-hours of labor:

For installing pump and sink	26
" " complete bath	140

III. THIRD PERIOD - LONG-TIME POSTWAR PROGRAM

ESTIMATE OF CONSUMERS TO BE SERVED

The total of 103,759 consumers which it is estimated will be served during this period represent those unserved establishments given in the 1940 census after subtracting the following:

1. Total consumers connected to REA lines since 1940 census.
2. Total consumers connected in first and second postwar periods.
3. Total unserved consumers living within sparsely settled areas which can be served only under broadened standards of feasibility.

Average cost per mile of line	$650.00 to $845.00
Man-hours per mile of line	200 to 250

FARMSTEAD WIRING

Average cost per consumer	$100.00 to $125.00
Man-hours per farmstead	30

FARM AND HOME EQUIPMENT EXPENDITURES

Based on same estimates as given in the transition period.

PLUMBING EXPENDITURES

Based on same estimates as given in the transition period.

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly 100 million dollars.

Specifically for the estimate of the approximately 17 million man-hours work involved in direct labor for construction of lines, it is estimated that about 68 million man-hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 25 million man-hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aid have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations have just begun."

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"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 per cent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions. Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."